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CONTENTS

	Page
Educational Reconstruction (3) : The Needs of Youth	455
Industry and Society (1) : Relation to the Nation	458
Infant Mortality. By Prof. Lancelot Hogben, F.R.S.	460
Early American Aeronautical History. By Capt. J. L. Pritchard	461
Lower Aquatic Fungi. By Dr. B. Barnes	462
History of X-Ray Analysis. By F. Ian G. Rawlins	463
Potato Eyes as Readily Transportable 'Seed' for the Colonies. By Sir Geoffrey Evans, C.I.E.	464
Some Aspects of Social Biology. By Sir Walter Langdon-Brown	466
Henry Trimen, F.R.S. (1843–96). By T. E. T. Bond	470
Obituaries :	
Prof. J. M. Macfarlane. By Sir D'Arcy Thompson, C.B., F.R.S.	471
Capt. R. D. Williams	471
News and Views	471
Letters to the Editors :	
Relation of Nucleotides and Nucleosides to Proliferation-Promoting Factors produced by Ultra-Violet Irradiated Yeast Cells.—Prof. Elton S. Cook, Sr. Ann Gertrude Cronin, S.C., Cornelius W. Kreke, Sr. Thomas Mary Walsh, *O.P.*	474
Chemical Nature of Chromosomes.—Dr. H. C. Choudhuri	475
A New Rapid Method for Penicillin Assay.—Ursula Wilson	476
Colour of Red Blood Corpuscles.—E. J. Bowen, F.R.S. ; D. A. Webb	476
High-Angle Edge Flaking of Flint.—Alfred S. Barnes	477
Identification of Male Schistosomes in Uncommon Sites.—Dr. F. Gordon Cawston	477
The Welsbach Mantle.—Prof. W. T. David	477
Bulb Correction in Capillary Tube Viscometry.—Dr. R. K. Schofield and Dr. G. W. Scott Blair	477
University of London External Examinations and the Technical Colleges.—Sir E. Graham-Little, M.P.	478
Importation of Technical Literature into Great Britain.—Dr. K. R. Webb, E. W. Balson, S. H. Harper and Dr. I. G. M. Campbell	479
Science, Christianity and Truth.—Dr. C. Berkeley	479
James Prescott Joule and the Unit of Energy.—J. H. Awbery ; Messrs. W. & R. Chambers, Ltd. ; Prof. J. B. S. Haldane, F.R.S.	479
Association of Special Libraries and Information Bureaux: Annual Conference	480
Scientific Study of the Amaryllidaceæ	481

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EDUCATIONAL RECONSTRUCTION (3)

THE NEEDS OF YOUTH

SINCE 1937 the promotion of facilities to enable young persons and adults to use their leisure in a wide variety of activities covered by the general terms 'social and physical training' has been recognized as an appropriate element in the education service. Between that year and the Education Act of 1918, local education authorities had been concerned only with the leisure activities of young people attending some school or other educational institution and under the age of eighteen. An amendment made in 1937 swept away these limitations, and particular attention has since been concentrated on the interests and requirements of young persons who have left school and passed outside the confines of formal training. But the objective of the National Fitness Council, as its name suggests, was only with physical fitness. In throwing out of focus a perception of the general needs of youth, this was a hampering limitation, and this is now recognized in the recent White Paper on Educational Reconstruction.

With the outbreak of war it was felt necessary to maintain and extend the influences which had contributed to the well-being of the young life of the nation. Accordingly, in November 1939, Circular 1486 was issued by the Board of Education empowering local education authorities, in conjunction with the national voluntary organizations, to set up youth committees which could immediately begin to formulate an ordered policy for youth and also suggest lines on which developments might proceed after the termination of hostilities.

Despite the restrictions and difficulties that the War has brought, the service of youth has made considerable progress. To-day, there is a far higher proportion of the young people of Great Britain associated with healthy and recreative leisure-time activities than at any period of our history, although the proportion is still lamentably low.

In order to bring together the ideas and experiences that have been obtained in the youth service since its inauguration, the president of the Board of Education set up a Youth Advisory Council in August 1942 to consider the position of the youth service as a part of the educational system after the War. So that its terms of reference might be clarified, the Youth Advisory Council was asked to assume : (1) that the school-leaving age would be raised to fifteen without exception, (2) that the period from fifteen to eighteen would be treated in some degree as an educational period in the sense that adolescents would be regarded as remaining the concern of the education service, and (3) that a system of compulsory part-time education during working hours would be established for all young persons after they had ceased full-time schooling, up to the age of eighteen.

The members of the Council were drawn from local education authorities, the national youth organizations, pre-service training corps as well as individuals distinguished for their work with young

people. In presenting its report*, which, of course, is in no way a statement of considered Government policy, the Council has made a valuable contribution towards promoting a more general understanding of this highly important field of youth service. The report is one to which no summary of its principal conclusions could do justice. To grasp the mixture of hard-headed realism and imaginative understanding which has inspired its originators, the report should be read in its entirety.

The Council has wisely refused to be tied to the precise age-groups which limit the entry of young people to certain organizations but has expressed the wish that, after the War, no age lower than twenty will be accepted as the appropriate upper limit to the youth service. Only by thinking of a boy or girl as a whole person, with a past and future as well as an adolescent present, can the subject be seen in proper perspective. It is with this 'wholeness' of life in mind that the Council begins its report with some comments on homes and families, the national system of formal education, religion in youth activities and the quantity and quality of work which young people are called upon to do.

Warm tribute is paid to the enthusiasm and endurance with which young people have met the challenge of war, and the belief is expressed that they will respond as courageously to the challenge of the post-war world if they are given a careful and thorough training for citizenship. To make this possible, certain conditions will have to be fulfilled. Thousands of young people have to live in surroundings which make it almost impossible for them to become good citizens. This scandal must be removed at the earliest possible moment. No fitter comment on this situation could be found than one written by Dr. A. E. Morgan in "The Young Citizen". "There is no reason why the environment of a working lad in his leisure hours should be inferior to that of a university undergraduate."†

It is part of the policy of H.M. Government to raise the school-leaving age to fifteen without exemption; but the Council recommends that full-time attendance at school up to sixteen years of age should be aimed at as soon as conditions permit. Up to the age of eighteen the first call on the working day should be education; the transition from full-time schooling to full-time employment should be a longer and more regulated process. Continued education must be regarded not as a concession granted by the employer but as a right given by the community. During the later years of compulsory school attendance, a wider variety of activities should be encouraged. The provision made for education for industry, and particularly for technical education, is inadequate and should be considerably expanded. Any raising of the school-leaving age would imply compulsory maintenance grants or allowances.

In the choice of employment service, existing arrangements are irregular and spasmodic. Young persons ought to be able to enjoy the benefit of expert advice given in the light of the individual's aptitudes and in conformity with the best modern methods of vocational guidance and selection. Local education authorities, employers, organized labour and the Ministry of Labour should unite to enable all young people and their parents to obtain skilled industrial guidance, both on first entry into employment and afterwards. Choice of employment powers should be made a statutory obligation of the local education authority, and until the law is altered to this effect, advisory committees under the administration of the Ministry of Labour should include members of the local education authority as well as members of the local youth committees.

Hours of work are too long. During war-time no boy or girl under sixteen should work more than a maximum of forty-four hours weekly; for those between sixteen and eighteen the maximum should be forty-eight hours. As a permanent peace-time regulation the permitted maximum for all up to eighteen should be forty-four hours inclusive of part-time school. Overtime and the accompanying high wages present grave social dangers which are likely to persist until a greater sense of responsibility can be fostered in the young people themselves. The quality of work, too, is often as objectionable as the quantity. If there is no solution of this problem inside working hours, increase in the amount of a young worker's leisure is necessary and urgent. The imperative need inside industry is to restore to every kind of work that sense of social significance which has largely been lost as machines have replaced men. Any tendency in the youth service towards the 'academic' in education should be resolutely opposed.

It is impossible to segregate religion from other activities; it must form the background of home, school, work and leisure alike. The Council is concerned to see preserved, or born, a genuinely Christian civilization, one whose members are not all necessarily professing Christians but one in which the Christian belief in God and all that is consequent upon it for human liberty and brotherhood, the Christ-like ideal of life, and the preservation of the fundamental ideas of truth, goodness and beauty, set the tone for society. Religion is a positive need for young people; the Council insists that it is nothing more than their due that religious opportunities should be provided. Such opportunities must, of course, be of varying character in order to satisfy not only the multiplicity of needs of the children but also the many demands of the parents. For religion is of such a profoundly personal character that any semblance of regimentation or any attempt at bringing about homogeneity are bound to prove failures.

With this background clearly outlined, the report goes on to discuss the fundamental problem of the right use of young people's leisure. Here it is of first importance to start from the point of view of the young people themselves and not from the angle of what the various agencies concerned can contribute to what they consider to be the right use of leisure. In emphasizing the wholeness of life, the Council here brings out what is probably its most important recommendation, namely, that unless we wish to rear

* The Youth Service after the War. (H.M. Stationery Office, 1943.) 6d. net.

† Young Citizen. (A Penguin Special.) P. 173.

a people incapable of exercising its freedom, there must be preserved a part of life in which young people should be left free to choose their leisure activities. These should not in any way become the subject of compulsion, and the greatest variety of opportunities for the right use of leisure should be provided. This recommendation is fully borne out by some research carried out for the Workers Educational Association during 1934–37 into the activities of youth organizations. The chief characteristics of young people inside these organizations were reported to be: (1) a dislike of externally imposed discipline, (2) a dislike of organization and complex loyalties, and (3) a severe code of discipline imposed from within the organization on members themselves and backed by open criticism and imposition of standards. Everyone is familiar with the boy or girl who is not by temperament attracted to communal activities and who finds the life of a club or any other organized body of their contemporaries overwhelming and uncongenial. In war, as in peace, it is undesirable to apply compulsion to the leisure hours of young people.

Further, the leisure hours of young people are so few that at first sight the whole paraphernalia of the youth service seems irrelevant and undesirable. So long ago as the year c. 38, Ecclesiasticus wrote that "the wisdom of a learned man cometh by opportunity of leisure", and it is time that this truth was fully apprehended.

Even more harmful than the excessive hours of work is the usual practice of limiting to one week the annual holiday of the working boy or girl. Despite the many difficulties that would arise, the community as a whole would benefit if all young workers could enjoy an annual holiday long enough to give them a real opportunity for recreation. A minimum annual holiday of twenty-four working days (inclusive of the six statutory holidays) is suggested, twelve of the days to be consecutive. Facilities and opportunities for the proper enjoyment of these holidays should be made available. To meet the needs of young people in their daily leisure, the work of voluntary organizations and statutory authorities should be strengthened and extended.

The youth service should operate to lead young people towards adult life; the fitful demand of adolescence is its desire to achieve maturity. The separate 'youth centre' with the buildings of the day continuation school (or young peoples college) as its physical nucleus cannot be regarded as ideal for this purpose, and it is suggested that statutory authorities in providing communal premises for youth work should plan them as part of adult community centres. This is essential to the process of guiding youth through the "delicate weaning stage from childhood to adulthood; from subjective dependence to objective independence; and if it is to be introduced to the main business of life, which is the attainment of the fullest self-expression, fraternally, economically, politically and spiritually."*

So that we may be prepared, provision should now be made for Great Britain as a whole, as part of educational reconstruction after the War, of facilities in town and country for educational, social and physical recreation.

When the youth service scheme was announced in November 1939, it was realized that the relation between the statutory authorities and the voluntary organizations might prove the stumbling-block to progress. Good will has pushed the stumbling-block aside and it has been proved that both have a part to play and that their respective contributions are essentially complementary. In the near future the problem of the statutory authorities in youth service work will become more pressing and their responsibilities greater. As these responsibilities increase, they will do well to remember that it was through the ideals and enthusiasm of the voluntary organizations that the first work for adolescents was undertaken, and that the policies and programmes of the voluntary organizations have been built on well-tried experience.

To make their much-needed contributions, the voluntary organizations must be strengthened financially; any scheme devised for this purpose should be flexible and so administered as to encourage free development. Extension of the help which the voluntary organizations now receive from public funds should be accompanied by some measure of public control over their activities. This could be done without interfering with the development of the organizations, if they issued periodical reports, published headquarters accounts, and submitted their finances to the scrutiny of the Board of Education. Where a local education authority gives local grant-aid to a voluntary organization, the authority, as well as the Board, should have the right of informed inspection.

This measure of control is not likely to meet with serious opposition from the majority of the voluntary organizations. One or two may object to any measure of public control and look aghast at what they consider to be the sinister approach of bureaucracy. For their part they must realize that many individuals who serve the voluntary organizations and have considerable power in their deliberations and pronouncements are as much paid servants as the officials of the statutory authorities. It may be that of late too much emphasis has been placed on the word 'voluntary' and that the time has come when at least some of these national organizations recaptured the spirit of service which animated their founders and which has meant so much to the welfare of the community.

The growth of the pre-service cadet corps has been so rapid that to-day they comprise a large proportion of the total number of boys who belong to a youth organization. Their development has been greatly helped by the considerable financial assistance given to units by the Service Departments. This assistance is related to the needs of war, and it is far from certain that, when the pressing needs of war are past, the Service Departments will be prepared to subsidize cadet work to anything like the extent to which they do to-day. Moreover, the motives which lead boys to join the corps in time of war will have lost much

* "Adult Education", *Quart. J. Brit. Inst. Adult Educ.*, 26 (September, 1941).

of their force. If the corps are to continue in peace to play any considerable part in the youth service, they must greatly develop the educational, social, and recreative side of their work. This suggests that the general responsibility for their administration, direction and finance should be turned over to the Board of Education and the local education authorities. At the same time it is essential that the Service Departments should prescribe and retain the supervision of both the content and the standards of the pre-service training.

The position of the National Association of Training Corps for Girls differs materially from that of the boys' pre-service training organizations. While it provides a certain amount of general pre-service training, it is not attached to any one branch of the Armed Forces and has never been under the control of the Service Departments. It is presumably an organization which, by the provision of a general type of training, offers to girls the opportunity of voluntarily continuing their education irrespective of a specific objective. It is desirable that the National Association of Training Corps for Girls should continue in existence after the War as a uniformed organization. The Board of Education and the local education authorities should extend to it the same degree of support as is given to other voluntary organizations.

The youth committees which were set up after the issue of Circular 1486 differ from one another both in constitution and efficiency. The essential qualification for membership is youthfulness, if not in years at least in spirit. It is far from certain that this 'young-mindedness' has been sufficiently insisted upon. Taking the broad view, however, the experiment of laying joint obligations on the local education authorities and the voluntary organizations has been successful, and the co-partnership needs increasing to the fullest possible extent. After three years of experiment, a useful function would be served if the Board of Education collected and issued for the guidance of all youth committees the information which by now must be available about the ways in which this very practical form of education in citizenship has developed.

The Council's broad survey of the field of youth is important for the emphasis it lays on the 'wholeness of life'. The home, school, employment, leisure, service and religion all interact for the development of intellect, skill, personality and character, and the Youth Advisory Council has wisely insisted that the whole upbringing of a boy or girl shall be in the widest sense educational. This is all to the good, for frequently do we end our arguments concerning the various failings of present-day youth—from lack of social sense to that of musical appreciation—with the everlasting demand, education and more education. By their challenging and long-sighted recommendations in the interests of youth, the Youth Advisory Council, fairly representing the opinion of the majority of youth workers in Great Britain, has presented the President of the Board of Education with advice to which he will no doubt pay the closest attention. Much depends upon it.

INDUSTRY AND SOCIETY (I)

RELATION TO THE NATION

A SIGNIFICANT indication of the widespread interest in the organization of industry after the War and the relations between industry and government can be seen in the references to these questions at recent important company meetings such as those of Boots Pure Drug Company, the Associated Portland Cement Manufacturers and Associated Electrical Industries. At the last-named meeting, Sir Felix Pole emphasized the efficiency and adaptability of industry as it is now organized; he leaned towards a planned organization of the cartel type, much as Lord McGowan did in a recent article in the *Sunday Times* on the place of combines and cartels. These and other addresses in the past few months show that the place and functions of private enterprise in the national economy are under re-examination.

Many factors have contributed to this position. War-time developments and the experience of war-time controls, the growth of restrictive practices, for all their denunciation by industrial leaders of high repute, our closer contacts both with Soviet Russia and with the United States—the recent visit to Great Britain of Mr. Eric A. Johnson, president of the Chamber of Commerce of the United States, has demonstrated some important differences in the British and the American view of creative private enterprise—have all played their part, and the general point of view has been well put by Mr. Herbert Morrison, particularly in his speech at Leeds in April. A case can be made for private enterprise in appropriate fields, as well as a powerful case for public enterprise. There is no case whatever for private un-enterprise, or for private control without the spur of free competition or of real social purpose.

That much will be generally admitted, particularly by scientific workers concerned with the prosecution of an adequate programme of scientific and industrial research as an integral part of post-war plans. The fresh scrutiny of private enterprise to-day, in spite of recognized shortcomings of State control during the War in certain directions, is due to the widespread appreciation that large sections of British industry were anything but enterprising in the twenty years between the two Wars. Attempts in some reports on reconstruction, such as those of the Federation of British Industries, the Association of British Chambers of Commerce, and, to a lesser extent, the statement on "A National Policy for Industry", to gloss over this record, and a timidity of outlook simultaneously apparent have not allayed this concern. On the contrary, they have stimulated fresh fears that such important associations are looking to policies of restriction and monopoly destined in the long run to be as fatal to their own interests as to the policy of full employment which public opinion, in Great Britain as elsewhere, is coming insistently to demand.

That much clearly emerges from the survey "Industry After the War. Who is Going to Run It?" which Charles Madge has produced as the first of the

"Target for To-morrow" Series*. But neither Mr. Madge in his summary, nor Sir William Beveridge in his introduction, goes any deeper into the fundamental issues than the statements already criticized. The Unilever paper, "The Problem of Unemployment", the more recent Nuffield College paper, "Employment Policy and the Organization of Industry after the War", and the report of the Sub-Committee of the Liberal Party on the relation of the State to industry, it is true, go nearer to the roots of the matter. Even in these, however, no real attempt is made to sort out the fundamental issues and to ask the all-important questions regarding the relations of Government and industry before an attempt is made to define the targets or formulate the lines of policy.

Such fundamental thinking is an essential preliminary, and without it plausible schemes for the self-government of industry are more likely to be snares or delusions than contributions to the solution of the problem of full employment. The fact is, as Dr. A. D. Lindsay points out in his recent volume, "The Modern Democratic State", that industrial or economic organization is not just an instrument; it partly moulds the society which uses it. Some recognition of this truth lies behind the general belief that the measures open to unregulated and unaided private enterprise will not suffice to vary the incidence of the trade cycle and to maintain a constant and high level of employment, but that a national economic policy is required to deal with cyclical unemployment. Before, therefore, we can determine the right relations of government and industry in a democratic society, we must have clear conceptions not only of the nature of that society but also of the place and functions which government and industry are to serve in it. It is the confusion on this point that has darkened counsel in so many of the proposals and discussions on industrial self-government, planning and the public control of private enterprise and production. The distinction between government and management is often overlooked and Dr. Lindsay's volume is to be welcomed for its contribution to the clarification of the issues on this point alone—a contribution which at least merits comparison with that of Prof. Ernest Barker's "Reflections on Government".

The leadership which industry has failed to supply is an essential in a society in which industry is to be a real social function, and the attention which has been directed to this point of late, notably in the statement on "Industry and Education" issued by Nuffield College, indicates that an attempt is being made to meet the need. If democracy is to survive, it will have to employ and use, as Dr. Lindsay truly remarks, every scrap of skill and knowledge and leadership it can secure. "A modern democratic state is only possible if it can combine appreciation of skill, knowledge and expertness with a reverence for the common humanity of everyday people."

That is the conception of equality which democratic institutions must express along with liberty. The function of the State being to serve the community and in that service to make it more of a community, a democratic government must be sensitively aware of the conditions which are making equality and liberty hard to maintain. There are clearly certain minimum rights and minimum standards of economic security which it must provide. But it must also be swift to diagnose and to deal with such obvious and outstanding evils as widespread unemployment, which so poison the life of a people that they make real community impossible.

In a democratic society this cannot be the task of the government only. The government must seek to enlist the help of all those free associations in which the life of society finds expression, and notably is this true of industry. The first step to self-government of industry is not so much freedom from government control as association and integration with the workers themselves. The joint production committees already set up in Great Britain may well be a step in this direction, and with a wise educational policy may so broaden the basis of recruitment that natural leaders are thrown up as they should be, and the closer integration of industry with the life of the community rendered possible.

Whether the joint production committees will provide exactly the type of machinery required to achieve this purpose requires further examination. They should be regarded as an experiment the results of which require study and comparison with those obtained in other experiments, for example, the autonomous groups of M. Dubreuil. Dr. Drucker has suggested a guild structure in industry, and unquestionably it should be one of our prime purposes to develop genuine local self-government in this sphere, to develop as Dr. Drucker urges, in "The Future of Industrial Man", social institutions in industry through which industry can become a functioning self-governing social community.

That would do much, by giving the individual industrial worker social status and function, to arrest the social atrophy which mechanization has often introduced. It would make also a decisive contribution to the establishment of the public confidence on which the Nuffield College statement rightly lays stress. Again, it is linked up with what Dr. Drucker considers the other essential in the establishment of a functioning society, namely, making the decisive social power into legitimate power, or in other words power derived from the consent of the governed. Clearly there is no surer way of gaining public confidence in the conduct of industry than the demonstration beyond question that it is directed to serve the needs of society and not merely the private interests of those who are engaged in it, whether they be investors, management or the workers as such. Misgivings on such points are in fact the main ground of uneasiness at present; they lead to the fear that price-fixing and restrictions on production are determined by considerations of private profit and not of public service and social needs.

The Nuffield College statement on "Industry and Education" does well to stress this factor of con-

* Industry After the War: Who is Going to Run It? By Charles Madge, in consultation with Donald Tyerman. (Target for Tomorrow, No. 1.) Pp. 64. (London: The Pilot Press, Ltd., 1943.) 3s. 6d. net.

fidence, for only by such means can we ensure the full co-operation of workers, management and consumers that is essential both for efficient production in the technical sense and for the service of social needs. In this sense morale is no less important in the normal operation of industry than it is in the war effort. The success of post-war reconstruction policy, and in particular that directed to full employment, depends at least as much upon the standard of morale in industry and in the nation as a whole as does our ability to win the War.

Given, therefore, that one of our objectives should be to create conditions in which industry has the best chance of developing as a social service, and in doing so develop real self-government and co-operation between management and workers, we can consider the machinery by which that broad objective can best be achieved. If one of the essential functions of the State is to remove the disharmonies which threaten the common life of the community, the more positive and constructive functions which the government is rightly expected to perform make it difficult to draw a clear line between the functions of a modern government and those performed by voluntary associations. The essential problem is in fact to arrive at such a balance between voluntary association and the compulsory organization of the State as will ensure the maximum harmony in communal life while keeping the State as the servant and not the master of the community.

The clue to the right solution here is not hard to find. It is a great mistake to assume that the strength of a government is increased by adding to its powers, because additional powers always impose additional duties. There are tasks which only a central government can perform; and if it is to discharge those tasks well, it is important to devolve on local authorities or even on voluntary associations all the functions they can competently perform. In the decision to centralize authority the *onus probandi* should always rest with those urging centralization.

Much of the present dissatisfaction with the machinery of government in Great Britain can be traced to violation of this principle. Failure to delegate responsibility or authority effectively may well be responsible for the central government becoming immersed—doubtless with all the exigencies of the War in extenuation, if scarcely in excuse—in a mass of detail that has prevented it from considering those broad issues of policy and making the decisions, for example, in regard to land policy, planning and building which are required before local and regional authorities can proceed with the more detailed planning and execution which is their responsibility. The consequences in industry are similar. As both the Nuffield College statement and the Unilever paper show, there are fields in which the Government must announce its decisions and lay down the broad lines of policy before industry can make its own plans, and this is independent of the exact structure of industry, and whether it takes the form of private enterprise or State enterprise. Unemployment, investment policy and exports are all matters of this type where Government initiative, guidance and control are the first requisite.

Unfortunately, Mr. Madge, in his "Industry After the War", fails to discriminate between the control and management of industry. The difference is important. If a measure of public control is adopted for a particular industry, the management of industry in the sense of the technical conduct of its day-to-day affairs must still be efficient. The fears as to Government control are largely due to this confusion between control and management, and its removal must be one of the first steps to secure the effective integration of industry as a social activity, whether from the point of view of securing the co-operation of workers or the confidence of the public in general.

INFANT MORTALITY

Birth, Poverty and Health

A Study of Infant Mortality. By Richard M. Titmuss. Pp. 118. (London: Hamish Hamilton, Medical Books, Ltd., 1943.) 7*s.* 6*d.* net.

AMONG indexes of disease and death none offers a more inviting field for research in the field of vital statistics than the infant mortality-rate. Its distribution among different social classes and different communities has an extremely high dispersion, and the general level within a single composite social group has unique features. While chances of death at other ages declined steadily during the whole of the last three quarters of the nineteenth century, both in Britain and in Western Europe as a whole, the death-rate under one year of age fluctuated about the same figure—150 per thousand for England and Wales—until about 1899. From 1900 there has been a continuous and spectacular change. During the subsequent half-century the number of infant deaths per thousand in our own country has fallen by more than sixty per cent. This being so, it is surprising that contributory social agencies have attracted so little inquiry to date. One reason is a hangover from an ideology widely current in the period when evolutionary concepts furnished a convenient rationale for an economy of unrestricted private competition and colonial misgovernment. What Sir Henry Maine called the "beneficent private war which makes one man strive to climb on the shoulders of another and remain there" was the prevailing creed of the universities when the existence of differential mortality first forced itself on public discussion. Foremost among articles of the creed was the postulate that class mortality and morbidity differences have their origin in differences of genetic constitution.

In conformity with a type of non-sequitur endemic in writings about what one calls eugenics on this side of the German Ocean and *Rassenhygiene* on the other side of the North Sea, differences which are inborn are also irremediable. By the same token, the probable existence of genes which affect resistance to smallpox would invalidate vaccination, and the certain existence of genes which affect susceptibility to cancer would veto radium therapy; but there were too few who recognized this dilemma. Nineteenth century thought about heredity could not as yet see beyond a miasma of misconceptions arising from identification of character differences with genes which determine them within a particular environmental framework. This we may amply deduce from the writings of Galton, than whom few writers have more powerfully influenced, and more deplorably

sidetracked, lucid thinking about the statistics of human populations. As a representative specimen of the Galtonian *Weltanschauung* the following is sufficiently eloquent: "We may, therefore, broadly conclude that the only circumstance, within the range of those by which persons of similar conditions of life are affected, that is capable of producing a marked effect on the character of adults is illness or some accident that causes physical infirmity. The impression that all this leaves on the mind is one of some wonder whether nurture can do anything at all, beyond giving instruction and professional training. There is no escape from the conclusion that nature prevails enormously over nurture when the differences of nurture do not exceed what is commonly to be found among persons of the same rank of society and in the same country."

It would be difficult to extract from deliberate utterances of reputedly competent men of science a combination of *naïveté* and nonsense so transparently belied by results of modern research on human nutrition, or, as R. M. Titmuss shows, more demonstrably belied by relevant data about the trend of mortality during recent years. In 1911 and 1931 the infant death-rates of Class I, the most prosperous section of the community in the Census categories for England and Wales, stood respectively at 76 and 33. Those of Class V—the least prosperous of the Census categories—stood at 153 and 77. From these facts alone several conclusions are compelling. Within so short a period as this no changes of the genetic structure of a population can have contributed significantly to either of two outstanding features of the shift. At both ends of the social scale the chances of death during the first year of life had gone down by about 50 per cent in less than one generation; and the chances of survival of a navvy's baby at the end of the period were as good as the chances of survival of a barrister's baby at the beginning of it.

For the benefit of those who have forgotten what eugenists were saying in 1911, there is no lack of evidence from the record of human superstitions. They are accessible in back numbers of the *Eugenics Review*. The difference between 76 (Class I) and 153 (Class V) was due to nature, and the efforts of Newsholme and others who sought to alter the *status quo* by changes of nurture were necessarily foredoomed to failure. Oddly enough, this presupposition went hand-in-hand with a hallucination which identified the fittest with survivors from the benefits of the most expensive medical amenities available for safeguarding offspring of prosperous parents against death from 'natural' causes. We now have before us the factual verdict of history. Contrary to what eugenists claimed at that time, events have shown that it is possible to reduce the death-rate of Census Class V to what that of Census Class I was in 1911. So the onus of proving that it is impossible to lower the deaths of Class V to the 1941 level of Class I lies on those who intrepidly and intransigeantly reiterate arguments conclusively disproved by what has happened before. In short, as Titmuss says: ". . . there are no medical, social or economic reasons why advanced communities should not achieve a rate of 15, for the knowledge formerly lacking is now abundantly available."

Besides making accessible in a readable narrative facts too apt to remain buried in census volumes on the shelves of libraries, R. M. Titmuss has undertaken a careful scrutiny of differential infant mortality to meet objections against the admitted imperfections of census classifications. The results of his analysis do not weaken the conclusions tabulated by the Registrar General's Office. They reinforce them. Therewith, the author of "Birth, Poverty and Health" has also extracted from official records another class of facts familiar to too few people and specially relevant to the role of nature and nurture. Among all classes of deaths which occur in the first year of life none is less susceptible to *known* differences of environment than those which occur in the first month. If genetic differences between social classes play an important part in differential mortality among infants, we should therefore expect to find a high dispersion of figures for neonatal deaths. For 1931 (England and Wales) we find that the ratio of neonatal deaths to deaths between 1 month and 1 year in Class I was three times as high as in Class V.

This supplies very strong evidence for the conclusion that the contributory role of environmental differences to observed differences of infant mortality is much greater in the least prosperous than in the most prosperous social groups. The same conclusion emerges from a classification of deaths with respect to diseases at present curable or incurable. The former account for about 86 per cent of total infant mortality. We are, therefore, in a position to state within fairly narrow limits the margin of further reduction which social legislation directed towards the fullest utilization of biological knowledge could achieve. The result fully justifies the anticipation cited above, and forestalls any ground for complacency. As Dr. Newfield remarks in the editorial foreword: "The absolute infantile death-rates among the poorer groups have indeed declined; but relatively to those in the economically better-favoured groups, they are higher, far higher, than ever before."

"Birth, Poverty and Health" is a refreshing indication that there is a rising generation of statisticians and social biologists who have thought their way through the luxuriant overgrowth of misconceptions which Galton's generation planted and Pearson's followers watered. It is temperate and stimulating, lucid and well-documented. It lifts a class of problems calling for immediate legislative action above the fog of political indignation to the level of a factual analysis of human needs and human knowledge available for implementing their satisfaction. As such it deserves a wide circulation among those who cherish what Bacon called the true and rightful goal of science. It is also valuable, because it emphasizes a need long overdue for more exhaustive research into the precise nature of the social agencies contributory to the decline of infant mortality, and the persistence of the differentials the author discusses.

LANCELOT HOGBEN.

EARLY AMERICAN AERONAUTICAL HISTORY

The First Century of Flight in America

An Introductory Survey. By Jeremiah Milbank, Jr. Pp. x+248+24 plates. (Princeton, N.J.: Princeton University Press; London: Oxford University Press, 1943.) 18*s.* 6*d.* net.

JOSEPH CONRAD, in his Nostroms, wrote "The Air of the New World seems favourable to the art of declamation". Judging by Mr. Milbank's book, the air of the New World, and particularly the air of New Jersey, has been very favourable to the art of reclamation of early American aeronautical history.

On December 17 next will occur the fortieth anniversary of that astonishing first controlled flight in a power-driven heavier-than-air craft which was to rank with the discovery of gunpowder, the coming of the printing press, and the wireless as a major event in the history of the world.

Mr. Milbank's history begins with Benjamin Franklin, who was fortunate enough to witness in France the ascent of the Charles balloon on August 27, 1783. In a letter to Jan Ingenhousz, physician to the Empress Maria Theresa, Franklin wrote, prophetically, "It appears, as you observe, to be a discovery of great importance and which may possibly give a new turn to human Affairs. Convincing Sovereigns of the Folly of wars may, perhaps be one Effect of it, since it will be impracticable for the more potent of them to guard his Dominions. It is a pity that any National Jealousy should, as you imagine it may, have prevented the English from prosecuting the Experiment, since they are such ingenious Mechanicians, that in their hands it might have made a more rapid progress towards perfection, and all the Utility it is capable of affording." He stirred up his own countrymen about the new invention with little delay in a letter to the American Philosophical Society.

On January 7, 1785, Pierre Blanchard and Dr. Jefferies crossed the English Channel from Dover in a balloon, and landed in France on almost the exact spot where 273 years earlier Henry VIII and Francis I met on the Field of the Cloth of Gold.

Blanchard was French, Jefferies was American (he was born in Boston and graduated at Harvard College in 1763), and the hazardous crossing which began at 1 o'clock in the afternoon finished at a quarter to four. There followed the usual spate of entertainment which seems to follow any dramatic flight (except, of course, the most important one of all, by the Wright Brothers!). Whether it was due to the two months entertainment or to some other cause, Jefferies gave up his aerial experiments and resumed his career as a medical man in Boston.

The first American ascent was in a captive balloon by a boy of thirteen, as the balloon was not large enough to lift a full-grown man.

Under the patronage of George Washington, Blanchard was the first to make a free ascent in America, on January 9, 1843, his sixteenth ascent. Although the ascent received considerable publicity, the Americans showed great apathy in taking up ballooning. The Frenchmen Guille (1879) and Eugene Robertson (1825) raised a certain amount of interest with their flights. Between 1830 and 1834 Durand with his ascents gave a fillip to the new art, but he was unable, in 1840, to persuade the general in command of the American forces fighting the Indians in Florida to use balloons for "spotting Indian camp fires by night excursions".

The one man in America who did most to direct attention to ballooning was John Wise (1808–79). He designed many of his own balloons, made many hundreds of ascents, carried the first air mail in America, and made every effort to get his countrymen interested in a projected voyage across the Atlantic by balloon. He was the inventor of the ripping panel which removed considerable danger from balloons landing in winds. His book, "Through the Air", gives much data on air currents, atmospheric conditions at various heights and electrical phenomena. Wise had a profound faith in the future of aeronautics and believed that the crossing of the Atlantic by air was not far distant.

Fired by Wise's exploits, another American, T. S. C. Lowe, rose to ballooning fame. To him belongs the credit of demonstrating the use of the military balloon for observation purposes in the Civil War. General Greely wrote: "it may be safely claimed that the Union Army was saved from destruction at the battle of Fair Oaks, May 31 and June 1, 1862, by the frequent and accurate reports of Professor Lowe." (All balloon experts in America were called professors.)

Following the Civil War, a new generation of balloon exhibitionists, acrobats and parachute jumpers took full advantage of the increasing interest of the American public. They served one useful purpose: to make that public air-minded and to arouse the interest of scientific men.

By 1890 more and more attention was being concentrated on the heavier-than-air machine, and the possibilities of the airship. Edison, ten years before, had begun his first investigations into heavier-than-air flight.

In 1883 came the first claim for a glider flight, by J. J. Montgomery, and in 1889 Octave Chanute began his great contributions and was publishing his classic work "Progress in Flying Machines". In 1895 was established the first American Aeronautical Society. Two years earlier, Langley, secretary of the Smithsonian Institution, Chanute, A. F. Zahm and others convened an aeronautical conference at Chicago at which Dr. Zahm read a paper on stability of aeroplanes and flying machines, Hargrave one on flying machine motors and cellular kites, and Langley his famous paper on the internal work of the wind. Here Mr. Milbank's history ends. Ten years after that meeting the heavier-than-air machine was an accomplished fact.

Mr. Milbank has written not only an extremely well-documented book but also one which may indeed be the basis for others. The author gives a complete list of his sources of information, and it is a tribute to his careful research into contemporary records. But as he rightly says in his preface, "This outline history of Aeronautics in the United States before 1900 has only scratched the surface".

It is to be hoped that the author will now begin to dig deeply.

J. L. PRITCHARD.

LOWER AQUATIC FUNGI

Aquatic Phycomycetes: exclusive of the Saprolegniaceæ and Pythium

By Frederick K. Sparrow, Jr. (University of Michigan Studies, Scientific Series, Vol. 15.) Pp. xix+785. (Ann Arbor, Mich.: University of Michigan Press; London: Oxford University Press, 1943.) 5 dollars.

THE lower fungi which inhabit fresh and salt water have been for a long time a neglected and mysterious assemblage of organisms, worked fitfully by some investigators, more intensively by others, but standing badly in need of a thorough investigation. Few of them are known to be of economic significance, many are supposed to be rare, most of them are tiny and demand very painstaking observation; to mycologists in general these fungi have been things to be avoided. The lack of any comprehensive account in English, and of a modern survey in any other language, has deterred would-be investigators,

who have recoiled from the unwelcome task of searching large numbers of scientific periodicals in a variety of languages, perhaps in the end to find imperfect descriptions difficult to understand.

Much of this is now changed. Dr. F. K. Sparrow, a graduate of Harvard now teaching in the University of Michigan, has provided an admirable guide to the aquatic Phycomycetes, and has abolished, or at any rate greatly diminished, many of the difficulties associated with them. He shows how these fungi can be obtained, often easily; he indicates how they may be observed, and he sets out clear figures and descriptions by means of which they can be recognized.

The generous financial support available to scientific workers in the United States enabled Dr. Sparrow to travel widely. He made two long visits to Great Britain, travelled in Europe, collected freely and observed intensively on both sides of the Atlantic, met mycologists having interests in common with himself, and altogether gathered an abundant harvest of experience, observations, material and impressions. In all ways he equipped himself to write his book, for he added deep and wide reading to his direct work on the fungi. Behind all this there was the tradition set up by the eminent mycologists who have adorned Harvard for the last half-century or so, a tradition of careful observation first, and speculation very much second.

As the title indicates, certain aquatic Phycomycetes are not dealt with in the book; that is because those fungi have been described in detail, and in fairly recent times, by other authors. Dr. Sparrow decided to fix the scope of his book by biological rather than by taxonomic limits. This has entailed a few omissions, and has meant that the descriptions of some of the groups are incomplete taxonomically. Two main series of fungi are described, drawn from what other mycologists have called the Archimycetes and the Oomycetes. The result justifies the scheme, and, now that Dr. Sparrow has shown how useful a biological criterion can be in obtaining a feeling of unity in a book, it is to be hoped that he, or another as well qualified as he is, will earn our gratitude by producing an equally satisfying account of the remaining aquatic fungi.

The book consists of a general introduction followed by a systematic account of the fungi, alliance by alliance. Each alliance is treated uniformly, with a general account of the development, morphology and biology of its members, followed by full taxonomic details of the families, genera and species. The liberal supply of keys makes the book easy to use. About half the space is devoted to the Chytridiales, fungi to which Dr. Sparrow has given much study, and of which he has greatly extended our knowledge. The Chytridiales, together with two smaller alliances, the Blastocladiales and the Monoblepharidales, are grouped together because of their uniflagellate zoospores, in parallel with a biflagellate series made up of the Plasmodiophorales, Saprolegniales, Leptomitales, Lagenidiales and Peronosporales. This convenient and acceptable grouping, though based on a character of the zoospore, is supported by other characters, and seems to bring out well the natural relationships of the fungi concerned. The systematic part is followed by a long list of the substrata inhabited by aquatic Phycomycetes, a very extensive list of references, and a full index. The illustrations are good and clear; it is interesting to note among them a portrait of Zopf, a mycologist whose work seems never to have had the recognition it merits.

The general introduction and the sectional introductions are clear and concise. In them, Dr. Sparrow includes firm, quiet statements of his own opinions, given without dogmatism. That sort of sober treatment characterizes the book and makes of it, in the best sense of the word, a solid contribution to the progress of botany. "Aquatic Phycomycetes" takes its place as the standard book on its subject; it is likely to be a long time before another author arises, able and qualified to write a better.

While the book will appeal chiefly to mycologists, it will be of the utmost value to all students of aquatic life, and will stimulate renewed investigation of the aquatic fungi. It should be in every botanical laboratory, and would not be out of place in zoological surroundings, for numbers of aquatic Phycomycetes have associations with animals, and we do not yet know how significant these are. It may be, for example, that Catenaria can be used to secure the biological control of the liver fluke.

A word of congratulation is due to the University of Michigan, for it is that body which has made possible the publication of the book. In these times, especially, it is refreshing to find that there is still money and sentiment in the world, available to support the production of books on specialized subjects remote from ordinary experience and of no obvious economic application. B. BARNES.

HISTORY OF X-RAY ANALYSIS

The History of X-Ray Analysis

By Sir Lawrence Bragg. (Science in Britain Series; Published for the British Council.) Pp. iv+24+4 plates. (London, New York and Toronto: Longmans, Green and Co., Ltd., 1943.) 1*s.* net.

THE British Council has done well to add this pamphlet to its "Science in Britain" series. Nobody else now alive could have written it with quite the same zest as Sir Lawrence Bragg: he has produced an essay in close accord with his title, the "History of X-Ray Analysis"; and that is what is wanted.

There are certain things worth saying even if, in other contexts, they have been said or implied before. One is the footnote on p. 3, which explains once and for all, to the layman, the difference between X-ray analysis and radiography. It is surprising how deep-rooted is the confusion about this in the popular mind. Another is the description of early days spent battling with a crystal structure, even "living with it", and dreaming of it for a year. To recapture such a mental atmosphere is exhilarating, and the gentle rebuke to the younger generation may not go wholly unheeded. Anyway, we shall do well to recollect it when looking up crystal structures, as we do now, with little more concern than finding telephone numbers. For the rest, there is much of interest, though maybe along somewhat more traditional lines.

The concluding paragraph raises a hope, now probably forlorn. It is that this little book might reach Prof. von Laue, to lift a trifle his distress of mind, and to assure him that a certain haunt of students and their teachers in Munich, as it was in 1912, is still an honoured memory.

F. IAN G. RAWLINS.

POTATO EYES AS READILY TRANSPORTABLE 'SEED' FOR THE COLONIES

By SIR GEOFFREY EVANS, C.I.E.
Royal Botanic Gardens, Kew

IT has been known for some time that the propagation of potatoes from small pieces of sets and even from single eyes or sprouts is quite feasible. Such methods have indeed been employed by nurserymen and others when the rapid increase of some specially good or new variety was necessary. It is only recently, however, that the practicability of introducing some such system into commercial methods of cultivation has really received careful attention.

It is obvious, of course, that if satisfactory crops can be raised by using only a small portion of the tuber as 'seed' there will be a great saving, as the remaining portion will be available for food or processing purposes, since this would represent a saving of between 80 and 90 per cent of the total crop. This is a matter of particular importance in war-time, when every pound of food is wanted and all waste must be eliminated. It is especially so in the U.S.S.R. where so large an area of food-producing land is in enemy hands.

Recent information[1] seems to indicate that practical means have been devised by Prof. Lysenko and his co-workers of the Lenin All-Union Agricultural Academy and that most of the potato tuber is now used for food, small portions of the skin, including the eyes, being reserved for seed purposes. Similar unorthodox emergency methods have been discussed by Copisarow[2]. Likewise, Polunin[3] has shown the possibility of small-scale cultivation of potatoes from detached sprouts.

But apart from the actual saving of food involved by these methods is the great saving of transport. In Great Britain alone, several hundred thousand tons of seed potatoes are moved from Scotland or Northern Ireland each spring to meet the demands of potato growers in England, and if 70 or 80 per cent of the bulk and weight involved could be eliminated it would mean a considerable relief to railways and the transport system, and would probably do away with the awkward delays in delivery that are bound to occur under existing conditions.

The particular problem that was placed before me, however, was the supply of potato seed to certain British overseas dependencies. Among those countries where the potato has now been established as a farm crop may be cited Cyprus, Malta, Palestine in particular, and also Kenya and parts of Nigeria. In these countries the potato has come to stay and is consumed not only by Europeans but also to an increasing extent by the natives themselves. In most of these places, however, experience seems to indicate that fresh seed needs to be imported either each year (especially in places where it is found impracticable to keep seed from one planting season to the next) or at regular intervals in order to re-introduce fresh and vigorous stocks.

War-time transport conditions have rendered these seasonal importations most difficult to maintain. Either transport is not available at the right time, since all shipboard space is required for military stores, or the voyage is so delayed by the hazards of war that the 'seed' arrives in a spoilt condition and often too late for the planting season.

It was decided, therefore, to explore the possibility of sending planting material by air, and it soon became evident that the sending of seed potatoes of the usual trade size by this means would not only be too costly but would also be impracticable owing to the weight and bulk of the seed. There seemed to be two ways of meeting this difficulty. One was to dispatch the 'seed' in the form of very small chats the size of marbles, and the other was to send the 'eyes'. The latter seemed to offer the greatest possibilities for air transport as the weight involved would be least.

The problem consists of devising some simple means by which the smallest possible portions or 'chips' of the tuber could be dispatched with safety by air with a reasonable assurance that when planted they would be capable of producing a crop at least comparable with that grown from normal seed. Allowing for reasonable delays in packing, dispatch and distribution, it was considered that such 'chips' would have to retain viability for about a month or so and would have to withstand a certain amount of rough handling.

A study of recent Russian literature seems to indicate that methods of this sort have been adopted on a very large scale in that country, but unfortunately no details are available of the actual method used or the means employed to 'cure' the cut end of the seed and to preserve viability until the planting season arrives. It seems obvious that unless the cut end can be sealed rapidly the entry of fungi or bacteria must speedily result in the death of the eyes. Experiments to this end have been conducted in the United States by the Franklyn Research Co. and other workers[4].

Arrangements were made to lay down some observation plots this year at Kew with the object of seeing how the relative yields of potato crops raised from eyes, chats and normal-sized seed compared. Spring had already arrived, but the necessity for not missing the growing season was realized, and therefore potato tubers were used which already showed signs of sprouting.

The method employed for preparing the eyes was deliberately designed to be as simple as possible, so that the procedure, if successful, could be adopted by any practical person with the minimum of labour and would need no special skill or manipulation. Most of the eyes on a potato are found at the 'rose' end, and so the tuber is held in the left hand and a thin slice or 'chip' cut off the 'rose' end with a sharp knife. These 'chips' varied somewhat in size with the shape of the tuber, but on the average they were about 1 in. in diameter, some being round, others more oval in shape. The thickness of flesh was about a ¼ in. at the thickest part. When sufficient 'chips' had been accumulated they were collected and placed, cut surface upward, on shallow trays, the bottoms of which were covered with a thin layer of peat-moss litter. The main object of the peat-moss was to prevent injury to the sprouts. The trays were placed on shelves in a wooden seed-store room at ordinary air temperature.

It was found that after about twenty-four hours the cut surfaces had hardened and that in three or four days they had assumed a concave shape owing to shrinkage through loss of moisture. In the field experiment those 'chips' which were cut on the morning of March 24 were planted on the afternoon of March 25 and a perfect stand was obtained.

With the view of getting some idea of the length of time viability remained good, a further lot of twenty-

four of these 'chips' which had been stored (after twenty-four hours over the peat-moss layer) in ordinary wooden seed boxes were planted on April 3, that is, ten days after cutting. During that time they had shrivelled to about half their original size and looked like slips of cardboard. All the twenty-four 'chips' planted sprouted and grew normally. A fortnight later another small lot was planted and about 80 per cent sprouted. No special treatment was given to the soil, which was in good average condition for planting so far as soil moisture and tilth were concerned.

The variety used was the main crop 'Majestic', a well-known commercial potato. The only material available was certified Scottish seed obtained through Messrs. Carters of Raynes Park, who were also instrumental in providing the chats required from the same source.

The weights of seed used worked out as follows :

Normal war-time seed	.. ..	15 cwt. per acre.
Chats for seed	.. ..	6¼ cwt. per acre.
Chips (eyes) *before drying*	.. ..	3 cwt. per acre.

War-time seed, it should be noted, weighs heavier than normal peace-time seed (which averages about 13 cwt. per acre) as it contains a bigger proportion of out-size tubers. The 'chips' when dried weigh less than half as much as the fresh material. In a small trial to find out the loss of weight, twenty-four rose ends or 'chips' weighed 8 oz. at the time of cutting. In twenty-four hours their weight was 7 oz., and at the end of another six days they weighed 3½ oz. In other words, the loss of weight after twenty-four hours was about 12 per cent and after a week about 65 per cent.

As the weight of fresh rose ends used for planting is about 3 cwt. per acre, the weight required after drying for a week will be about 1 cwt. In other words, one fifteenth of the weight of normal seed would be required. This is a matter of great importance in connexion with the export of potato seed for overseas countries when transport has to be considered. So far as yields are concerned, owing to limitations of land and labour it was only possible to carry out plain observation plots which consisted of three rows 96 ft. long of each kind of seed. The rows were 2½ ft. apart, but whereas the whole tubers were planted 1½ ft. apart, the chats and the 'chips' were planted 1 ft. apart. There was also a difference in depth of planting depending on the size of the planting material used; the larger the size the greater the depth. Thus the whole tubers were planted at a normal depth of 6–7 in., the chats 3–4 in., and the chips 2–3 in. The young plants were earthed up as they grew in the ordinary way, and on account of danger from spring frosts it was found necessary to earth the 'chips' rather sooner than the other two as the shoots appeared above ground somewhat earlier, but sprouting was very even in all the rows. The early part of the growing season was dry and cold and growth was slow. This was especially true of the 'chips', which were retarded by the necessity for early earthing up as a protection from frost, but as the season advanced these rows rapidly progressed and by the middle of July they had covered in as well as, if not better than, the other two. The plots were harvested on September 29.

The size of the plots consisted of three rows of 96 ft. × 7½ ft. or just about 1/60 of an acre each. The yields are given in the accompanying table in lb. per plot.

The crop after harvesting was put through two riddles of 1 in. and 1½ in. to separate out the tubers into three sizes.

In general the results from these small preliminary trials are promising in so far as they indicate the possibility of raising satisfactory crops of tubers from the rose ends dried into 'chips', by a simple and easily manipulated method. The results indicate that, while the yield from the 'chips' is not quite so good as it is from normal seed, yet the crop is satisfactory and better than that from chats. But it is obvious that much more needs to be done and that detailed experiment is needed to follow up this year's trials. In the first place it will be necessary to standardize the method of preparing the 'chips' for export. We still have to ascertain how long the viability of the chips can be maintained. There is also the question of dormancy in the potato. In the trials described above, seed was used which had already begun to sprout. It remains to be seen whether equally good results will be obtained from unsprouted seed. Details of planting also need further investigation. In thi, year's trials the 'chips' were planted one foot aparts but there is reason to believe from the experience gained that a somewhat wider spacing might give equally good results. Experiments are also needed in the depth of planting, and it is necessary to determine the varieties most suitable.

Method	Total yield	Grading and approximate % of total yield					
		Ware		Seed		Chats	
		Weight	%	Weight	%	Weight	%
EYES— (3 rows, each 96 ft. long, 2 ft. 6 in. apart, 12 in. between sets)	526 lb.	475 lb.	90·3	33½ lb.	6·4	17·5 lb.	5·3
CHATS— (3 rows, each 96 ft. long, 2 ft. 6 in. apart, 12 in. between sets)	474½ lb.	411½ lb.	86·75	31 lb.	6·5	32 lb.	6·75
NORMAL SEED— (3 rows, each 96 ft. long, 2 ft. 6 in. apart, 18 in. between sets)	613½ lb.	556 lb.	90·96	29½ lb.	4·84	25½ lb.	4·20

The chief application of this system would probably be with the Mediterranean territories, that is, Cyprus, Palestine and Malta in the first instance, although there are also possibilities in Colonies farther afield such as Nigeria and Kenya. In the Mediterranean countries the planting seasons vary. Thus in Cyprus the main crop, it is stated, is planted from August to mid-September. In Palestine the autumn planting is from mid-August to mid-September, the main planting in November and the spring planting from January to March. In Malta the spring planting is December to February, the summer planting March, and the autumn August–September.

If the seed is to be provided from Great Britain

for the August–September planting and if the tubers have to show signs of sprouting before preparing the 'chips', it is possible that an early variety of potato might be most suitable. For the later plantings, mid-season or main crop types would probably succeed. These and other details afford a fruitful field for future investigation.

Meanwhile it is hoped that it will be possible to send out small trial consignments of 'chips' to these Colonies by air or fast ship transport during the present autumn. The chief advantage of the system seems to be in the great saving in transport space and weight, and it would seem therefore to be specially applicable to the large and increasing trade in certified seed potatoes with the overseas markets.

[1] Information supplied by the Ministry of Information from collected reports from Russian sources.
[2] Copisarow, Maurice, NATURE, 151 (1943).
[3] Polunin, *Gard. Chron.* (January 23, 1943).
[4] *Amer. Potato J.*, 14, 23 (1937).

SOME ASPECTS OF SOCIAL BIOLOGY*

By SIR WALTER LANGDON-BROWN

IT requires all one's power of sympathetic imagination to penetrate the intellectual and spiritual twilight amid which Henry VI lighted twin lamps of learning at Eton and King's College, Cambridge, following the example of William of Wykeham at Winchester and Oxford. The bright dawn of the passionate desire for learning that lighted the end of the twelfth century had faded away, the land had been devastated by the Black Death and the nation was being exhausted both materially and physically by the Hundred Years War. For nearly a century no new college had been founded at Cambridge, and Oxford was in a decline. The efforts of this saintly weakling, Henry VI, have thus proved more enduring than his father's victories and more significant than all the internecine struggles of Yorkists and Lancastrians. It is his imperishable glory to have proved the superiority of things of the mind and spirit over the clamour of battle. Well did Wordsworth say of him

"Tax not the Royal Saint with vain expense".

There is another aspect of his times which is germane to the subject of social biology. The human mind is too apt to prefer revolution to evolution. So much so that well into the nineteenth century men believed the world to have been constructed by a series of geological catastrophes. It required the labours of many geologists to prove that the principal agencies were the same as those peacefully at work to-day. Slow erosion and steady deposition of stratum after stratum have wrought more than all the volcanoes and earthquakes. Yet man still tragically retains his belief in methods of violence. But when we come to closer examination we find that, as Thomas Mann pointed out soon after the War of 1914–18, revolutions often really conceal reaction. His essay does not appear to have excited much interest at the time, but it was so prophetic in tone and so penetrating a study of German mentality that it gains fresh interest at the present juncture.

He starts by adopting Nietzsche's view that the latter part of the nineteenth century was characterized by two leading motifs—reaction masquerading as progress, and subservience of reason to emotion. Though not confined to Germany they were specially potent there. He elaborates this by maintaining under the first heading that reformations by their very nature may have little to do with progress, since they tend to re-establish the old in an extremely conservative sense, and that at a time when the new is already known, while the second arouses sympathy with the chthonic and daemonic, with night and death—in short, with a primeval and earth-born religion. This recognition of the feeble control exerted by the reason and intellect, and of their incapacity to condition life, has led to scorn being poured on reason as an unfruitful illusion, and to the reinstatement of the irrational and instinctive. When reaction disguises itself as revolution, it succeeds best with youth, which not being fortified by experience against such tricks, can be beguiled into accepting the most outworn devices as promising novelties. The revolutionary freshness of youth has impressed upon it the "principle of mindless nature, the folk soul, hatred, war . . . the great retreat dressed out in the uniform of the advance guard . . . Is youth really going to fall victim to this crude abuse of the new knowledge ? . . . We are no longer strangers to the disheartening sight of youthful bodies in gay quickstep, songs arising from young life, arms flung in a Roman salute, wasting the fine flight of their youth upon hoary ideas." Since he wrote those words, history has answered his questions. As Kerr Clarkson expressed it in his "Europe in Eclipse", Hitler's "Youth Movement was his method of harnessing the challenging demands of puberty to the service of the State", while Howard Smith in his vivid "Last Train from Berlin" concluded from study on the spot that the Nazi "Ship of State has ridden the waves, not of the future, but of the blackest past". Hitler has completed what Wagner began—the exploitation of the myth.

The recent arrest of the veteran physiologist, Prof. Lapicque, in Paris and the suppression of the *Presse Medicale* are typical of much. Science, literature and art are to be tolerated only in so far as they are within the comprehension of the autocrat. Any higher values are met with the retort of Goethe's Mephistopheles : "I am the spirit that denies".

Indeed, we must admit that a reactionary element is not uncommon in revolutions. The lictors' rods are suitable symbols for Fascism, for the Romans have been the most persistent *laudatores temporis acti* in all history, even in the moments of their greatest conquests. The renaissance of Irish nationalism gained force from the Celtic twilight, represented poetically by W. B. Yeats and pictorially by his brother.

One of the most striking forms which this reaction has taken is a denial of the advantages of liberty—and that underlies much of the planning so fashionable even in Great Britain, while the other is the conception of the State as the supreme force. In my youth the State in England was on the whole benevolent to the individual, though like a rather inquisitive Auntie about our pocket money. It was not until I began to travel abroad that I realized that on the Continent the State was in the main hostile to the individual. Totalitarianism is no new idea, and when it is adopted, the deification of the State, the divine right of kings revived in a still more absolute form, is not far off. Indeed, Hegel proclaimed the State as the "divine idea

* Substance of the opening address to the British Social Hygiene Council's Summer School held at Eton College during August.

as it existed on earth". But when the State becomes God, it soon declares itself as indeed a Moloch, passing its own children and those of others through the fire. As social biologists we are naturally concerned to discover how things have come to such a pass, and it is somewhat disquieting to find that science has unfortunately played its part, not merely by placing powerful weapons of destruction in hands unfitted to use them, but more subtly by promulgating as facts, views of heredity which are merely theories. In the hands of pseudo-scientists this has wrought much damage.

Instances which will occur to anyone are the perverted use made of Darwin's phrase "natural selection" and Herbert Spencer's "Survival of the Fittest". No one stopped to inquire "fittest for what?" and I regret that Sir Arthur Keith permitted himself to utter the palpable error that the "pruning hook of war" exemplified natural selection. At any rate, neither Darwin nor Herbert Spencer ever ruled out the idea of progress. That was left to Weismann, the Calvinist of biology as I have often called him, with his rigid delimitation between the soma and germ plasma. This denied the possibility of the inheritance of acquired characters, which Darwin to the end of his days was never dogmatic about. Hope stirred once more when mutations were discovered, only to be dashed again when it was found that the great majority of mutations were unfavourable to survival.

Meanwhile the study of variation, for which Darwin had never been able to account, underwent complete re-orientation when the Abbé Mendel's forty-year old work was rescued from oblivion. Genetics became an exact science, and it was found that man was a very variable animal. Only 9 per cent of us are obliging enough to have our greater splanchnic nerve as figured in the anatomical text-books, and it has been laid down that nothing should be labelled as an abnormality unless it occurs in less than 4·5 per cent of individuals. A 'normal' man is merely an intellectual concept; we are of an infinite variety. Moreover, to these structural variations the chemical embryologist has added many functional ones.

The time is ripe, therefore, for a full inquiry as to the inheritance of acquired characters. To do so is, of course, rank heresy, which is usually rewarded with excommunication by accredited men of science. I am therefore rejoiced to find that Prof. Wood-Jones in his little book "Habit and Heritage" has courageously dared this: first, because biologists of the past have been too exclusively interested in structure to the neglect of the moulding force of function, and secondly, because the social applications of biology have foundered on this rock more than any other. As Prof. Wood-Jones says "it is a patent fact that there has been a lowering of standards and a shrinkage of human spiritual ideals". The grafting of ridiculous claims for the application of the term 'fittest' to a certain section of the community on to the Darwinian survival thesis has gone far towards producing the sinister theories which have let loose the present demons of bloodshed and destruction. These terms, employed in the first place as purely scientific expressions, have become converted into the slogans of propaganda for acts of unthinkable brutality on a vast scale. Loud voices acclaim that it matters not if we live good lives or bad for, apart from direct disease or social degradation, we cannot hand on to our descendants any virtue or vice, any talents or degeneracies that we may have acquired during our lifetime. Consequently there was no prospect that we shall ever be able to bring about a permanent elevation of the human race by means of education and practice.

Science has broadcast the doctrine of the survival of the fittest; pseudo-science has grafted on to this pronouncement the implication that the fittest are those most red in tooth and claw. Science has broadcast the doctrine of the non-inheritance of acquired characters; pseudo-science would translate this doctrine into a thesis of racialism more cruel, more destructive of hopes of human betterment and of the attainment of international amenities than any of the other bastard slogans of our times. Therefore man inquires into the basis of the theory of such non-inheritance and finds it lacking. On the other hand, he brings forward evidence that germ cells do not possess that developmental, anatomical and physiological isolation from body cells demanded by Weismann's theory. The recent advances in chemical embryology support this proposition. The earlier stages of development are extraordinarily plastic prior to the appearance of any germ cells. This strikes at the root of Weismann's theories. But the inheritance of acquired characters in any event could only be in a very gradual process, and cannot yet be regarded as proved.

It would not be just to ascribe all the disastrous deterioration in moral values to mishandling of the biological theories. Certain philosophers and especially Hegel must take their share of the blame. When we inquire into the validity of the claim for "the biological necessity of war", it is interesting to learn what light the newer psychology has to throw on the subject. We shall at once be told that aggressiveness is deeply inherent in human nature, but it is repressed by society until it becomes so intense that it can find an outlet only in warfare. But when we ask what is the origin of this aggressiveness we are given two diametrically opposite answers.

Thus Freud attributed it to the persistence of childish hatred against parents, brothers and sisters which he regarded as our most fundamental impulse. He maintained that social feelings arise as a superstructure founded on these jealousies and rivalries, and thus the hatred we repress with difficulty remains the mainspring of our corporate life. His own feelings are displayed in his statement that "the masses are both lazy and stupid, and their ingrained laziness will not be removed by kindness but only by leadership prepared to use appalling force . . . One cannot deny the grandeur of this project". Well, his nation have experienced this since those words were written, but "the grandeur of the project" is perhaps beginning to lose its appeal.

On the other hand, Ian Suttie, who was trained in the Freudian School and used its methods for years, concluded that aggressiveness originated from the thwarting of primary natural love. Dr. Ranyard West in his interesting study of "Conscience and Society" says that Suttie puts forward the biological and individual role of the nourishing and protective mother and the sociological reactions which may result from her place in life as opposed to those of Freud's threatening father. Thus for Suttie the germ of society is a band of brothers and sisters gathered under a mother, as opposed to Freud's brothers banded in hostility against a father. I might interpolate here that it is, of course, quite possible for a matriarch to imitate Freud's conception of a father. I recently read Harold Nicholson's "Life of Hamilton

Rowan", whose dominating mother was the mainspring of his rebelliousness throughout his life, despite his frequently expressed desire to please. West goes on to say that the reactions of Suttie's patients were different from those of Freud because the personalities, the mental adherences and the faiths of the two analysts diverged.

Now if two astronomers working with similar telescopes at Greenwich and in Cape Town gave different times for the rising and setting of the moon they can both be right, the difference being due to their different positions on the globe. But psychologists are not observing through telescopes; they are observing human beings through their own minds which are deeply coloured by their own experiences. In the same way, a portrait, unlike a photograph, tells us much about the man who painted it.

Now this divergence between philosophers is no new thing. Nor is totalitarianism a new idea. It was first proclaimed by Thomas Hobbes in the seventeenth century. Although he was born in the year of the Armada and lived nearly up to the time of our Revolution in 1688, thus seeing great changes, he never altered his view that men were all selfish and aggressive, each against his fellows in a life that was "nasty, brutish and short". "So in the nature of man," said he, "we find three principal causes of quarrel—competition, diffidence and glory. The first maketh a man to invade for gain, the second for safety and the third for reputation". Thus war was the natural state of mankind and "force and fraud are in war the two cardinal virtues . . . Covenants without swords are but words and of no strength to secure a man at all." In that last respect he would find more to agree with him now than in the nineteenth century!

Yet the physician-philosopher, John Locke, who lived through the most disturbed part of the same century (as he said "I no sooner found myself in this world than I found myself in a storm") differed from Hobbes in precisely the same way that Suttie differed from Freud. He believed that a demand for social love and approval from his fellows was the primary emotion in man. He averred that he who "declares himself to live by another rule than that of reason and common equity [committed] a trespass against the whole species". Ranyard West's comment is "in contrast with Hobbes, Locke's state of nature is in fact a state of good nature . . . Where Hobbes sees anarchy unless men give up self-government, Locke sees a natural community which will improve its condition by careful self-government and run no risk in the process". To-day it is of special interest to read of this controversy of nearly three centuries ago between two opinions which hold the field to-day.

Now it is significant that Hobbes had a violent father and Locke had not. Hobbes' mother had such a dread of the Spanish Armada that he was born prematurely. As he put it long afterwards, "She brought forth twins—myself and fear". A brutal father and a terrified mother bred in the son a gloomy totalitarian philosophy which had an unfortunately wide influence.

Indeed, in view of the tremendous influence of our early upbringing, it is not surprising how frequently philosophers and psychologists who regard hate as the strongest motive had unkind or even brutal fathers, while those who put love in the first place had affectionate mothers.

What is true of these learned men is of general application. It adds new force to the recognized vital importance of the home; it adds tremendously to the responsibility of parenthood. It is well known what a large proportion of neurotics and criminals come from 'broken homes'. There are plenty of instances of totalitarian leaders having an unhappy childhood.

The fatal flaw in Hobbes' premises was that he regarded human beings as isolated individuals *in vacuo*, whereas inescapably the earliest social group is the family, and the reaction of the individual to that group determines much of his future outlook on the whole of his subsequent life. As a medical man I am profoundly impressed with the truth of this. Let me take what may seem a trivial illustration: the myth of Santa Claus. Here is a boy who determines to find out about it and soon discovers who plays the part of that Christmas visitor. He is not capable of realizing that this is merely the mythical expression of an encompassing parental love, and later on may reject the symbolism of the Book of Genesis—at least until he is over forty. His sister may suspect the identity of Santa Claus, but may close her eyes to it, clinging longingly to the idea of the nocturnal visitant with his reindeer sledge. Later on she will be equally ready to close her eyes to anything which she fears might shake her rather timorous faith.

I have on a previous occasion urged the importance of a boy's reaction to his first realization that his hitherto thoughtless cruelty is wrong. I am sure from the histories I have often obtained that this is an almost universal and dramatic experience. It has been beautifully related by Frank Kendon in his delightful book "The Small Years". If cruelty is persisted in after that, what has been almost natural behaviour assumes a new significance, and the seeds of sadism are sown. "For without the law sin was dead, . . . but when the commandments came, sin revived".

Of the tragic results of both bad heredity and bad early environment in exalted circles, one could scarcely find a more striking example than the founder of Eton College. Henry VI succeeded his father when only nine months old. Henry V was no mere swashbuckler; he had a strong sense of justice and was fond of music and literature. So far so good, but his mother's stock was bad. With such heredity and an unfavourable environment it is not surprising that he had a complete mental and physical breakdown when he was thirty-two. The loving meticulous care he devoted to his two foundations, which he initiated when only eighteen, gave promise of a happier career had he not been doomed from the cradle by a thoroughly evil family environment.

It has been well said that heredity determines what we can do and environment what we do do. The trouble with eugenists is that they are not always clear what their aim is—whether for brain or brawn. Certain it is that a biological inferiority may be consistent with genius. Turner's defective eyesight was utilized by him to create gorgeous visions, many immortal works have been produced by the tuberculous, and Beethoven's hereditary otosclerosis did not prevent his reaching supreme heights in musical composition.

Carr-Saunders has recently reminded us that we find it more attractive to think of mastering our surroundings than of mastering ourselves. The pioneer efforts of Galton in the latter direction were weakened by his conventional class consciousness and lack of appreciation of social problems; still truer was this of some of his disciples. Consequently professional biologists stood rather aloof, and indeed

until the re-discovery of Mendel's work lay bare the mechanism of inheritance, eugenics could scarcely claim to be a science. The obstacles in the way of making a genetic analysis of man are immense, but apparently the results obtained so far do not clash seriously with Galton's intuitive conclusions. We must remember that inheritance merely means that offspring get their genes from their parents, while environment includes for man not only physical factors, as for all animals, but also the provision of opportunities for learning.

The object of social organization is not standardization, but the creation of conditions under which genetically unique individuals (which we all are) can best fulfil the promise that is in them. Unfortunately there is reason to suspect that the genetic material in a civilized society deteriorates slowly, but almost certainly, for harmful mutations are preserved which would perish under cruder conditions. True, they are compensated for, but that is not cure, and their persistence must be injurious to the common stock. There are always some people of subnormal mentality and physique who cannot hold their own in the circle in which they were brought up and who therefore tend to sink. The damage is enhanced by the inverse relation which exists between social class and fertility, even though this is now on the wane, except in the lowest group of all. In the other strata the average of intelligence does not vary greatly. But the danger of unfavourable mutations occurring and being encouraged to persist Carr-Saunders regards as insidious, for there is a not inconsiderable element in the population which by reason of inferior hereditary endowment cannot take advantage of a good environment.

Biology can be a useful corrective to the machine-minded planners who are running riot to-day, for man is not a robot. We start with the initial advantage that children are all intensely interested in the manifestations and origins of life—sometimes to the confusion of their more conventionally minded elders. Though of recent years motor-cars, aeroplanes and radio have claimed an increasing amount of their attention, there are few who do not, if they can, keep some kind of domestic pet, occasionally of a somewhat exotic type. It would be a real disaster if education were so directed as to suppress this interest in living things instead of using it as the basis for learning something about man's place in the universe among other forms of life.

On one hand it seems illogical to separate scientific questions from their application to human affairs, while on the other hand it is absolutely essential that there should be complete freedom in scientific research. Yet at the moment there is a decided movement to place research under State control. Liberty seems to be a demoded ideal. We may legitimately inquire how it can be determined at the outset of a research what its practical benefits will be. What we do know is that most of the great scientific discoveries have been made by men actuated simply by a thirst for knowledge. As Prof. Starling said, all knowledge faithfully pursued for its own sake ultimately yields useful results. Thus one of my teachers, W. H. Gaskell, researched on the rhythm of the heart and on the sympathetic nervous system without any thought or even interest in possible clinical applications. It was not until several years later that this work became the basis of newer conceptions of heart disease and of the effect of the emotions on the state of the viscera.

Biology can bring valuable information and advice to the statesman, if the evidence is objectively criticized by those scientifically trained, but if controlled by politicians it rapidly deteriorates into a fallacious guide; a blind leader of the blind. Indeed, we know that with the best will in the world it is extraordinarily difficult to remain sufficiently objective if we start a research for the purpose of establishing a preconceived hypothesis. I gave up laboratory research myself partly because I felt that difficulty was too great for me. The goal of clinical research, on the other hand, is pre-ordained—the healing of the patient. Politics, being in its essence tendentious, cannot control objective science without disaster. The converse aid which biology can render to statesmanship is admirably indicated in Dr. K. E. Barlow's admirable little book "The Discipline of Peace". He bases his appeal on the broadest biological grounds. He insists on the inexorable interdependence of soil, vegetation and animal life, pointing out in no uncertain tones the failure of the industrial age to observe it and the grave consequences thereof. In an interesting way we are led from a consideration of the building up of fertile soil by vegetable life to the building up of potential energy through photosynthesis by plants, which provides for the kinetic activities of animals, combined with the reverse process by which animal and vegetable waste products are utilized. The facts are well known, though not, as he shows, always acted upon. But the point he emphasizes is that each of these entities is obliged to follow its own discipline, and that interference by man can and does disastrously upset the balance. Deforestation, often merely to supply newsprint, and agriculture pursued to yield immediate returns regardless of the future, are rapidly reducing large areas of previously fertile land to dustbowls or swamps. Industrialization has led to excessive raids upon Nature to supply the machine, and the products of those machines have in turn to be bartered for yet more products of the soil. Moreover, it has led to aggregation of population into towns, thus simultaneously increasing the demands on Nature while diminishing its yield. Man must cease to be a bandit of the soil and in turn observe his own discipline, which he can do only by the free exercise of his intelligence. If we want to build a world in which men can live at peace, we have no choice but to pass to a new era in which man must concern himself with the balance and harmony of life. The whole thesis is convincingly worked out to show that while physics may increase our material comforts (or we might add, pave the way to new disasters), only biology can be the scientific guide to a true way of life.

In conclusion, may I suggest that all of us as teachers can gain inspiration and refreshment from Sir Charles Sherrington's short book on "Life's Unfolding", traced from the synthesis of the protein molecule, through the microscopic cell, on to an "organized life-system centred upon itself". Here it is interpreted by a master of science who also has the mind of a philosopher and a poet. He reminds us that wonder commonly vanishes with childhood. The wonderful is taken for granted, so as to enable us to get on with life. Much later, when life's pace is slackened, wonder may return. Wonder, then, is the mood in which he invites us to approach his subject; and it is indeed a wonderful re-telling of the story, vivid and yet accurate in its details. One is reminded of a picture which, having become dulled in colour, is restored to its pristine freshness by a

skilful hand. Take, for example, the description of the great adventure by which marine animals adapted themselves to a terrestrial existence and yet still carry the salt of the archaic sea in their internal economy. Avoiding anthropomorphism in his discussion of 'higher and lower' forms of life, he still claims that range of dominance of the environment is a feature to which the term 'higher' can be accorded. Since mind is one of the great keys to this dominance, the term is almost graded by degrees of mind. At the present time, man is, as regards conquest of his surroundings, the most successful of all living forms. On that ground we can acclaim him the highest of all living forms.

It is towards greater control over that environment, which also involves greater control over ourselves, that the lessons of biology and all its application should lead. For in the wise words of Plato, "Civilisation is the victory of persuasion over force".

HENRY TRIMEN, F.R.S. (1843-96)

By T. E. T. BOND

Tea Research Institute of Ceylon

HENRY TRIMEN was born in Paddington, London, on October 26, 1843. He received his education at King's College School (then in the Strand) and even as a schoolboy showed an ardent liking for natural history, beginning to form a herbarium and frequently visiting the Botanical Department of the British Museum to determine his collections. As with so many others of those days, he found his best opportunity of receiving further biological training lay in the study of medicine, and from school he entered the Medical College at King's in 1860, graduating M.B. with honours in 1865. After graduation he held for a short time an appointment as medical officer during a cholera epidemic in the Strand. But already it was clear that his main interest lay in the field of systematic botany. For this subject he was exceptionally well endowed with a natural ability for thorough and accurate observation and with a strong interest in historical studies, while his work throughout was characterized by a breadth of outlook to which his medical background made no small contribution.

As an amateur botanist, Trimen had already made a name for himself by adding to the British flora our smallest known flowering plant—the duckweed *Wolffia arrhiza*—and he had also taken an active part in the proceedings of such bodies as the Society of Amateur Botanists (now defunct) and the Botanical Exchange Club. Official recognition soon followed in his appointment, in 1867, as lecturer in botany at St. Mary's Hospital Medical School and, two years later, as assistant in the Department of Botany at the British Museum. His position now gave full scope to his abilities and he applied himself actively to his chosen fields of interest. In systematic and topographical botany, his best-known early work was the "Flora of Middlesex", projected as a joint publication with his former school-fellow Dyer (afterwards Sir W. T. Thiselton-Dyer) and completed in 1869. Several other papers followed, including critical studies of British species of Polygonum, Rumex, etc. His work in the interests of the botanical community in general was of no less importance and included the arduous task of editing the *Journal of Botany* for nearly ten years. He took an active part also on the council of the Linnean Society of London, of which he had been a fellow since 1869. Finally, mention must be made of the notable series on "Medicinal Plants", undertaken in collaboration with Prof. Bentley, and published in instalments from 1875 onwards. Trimen's contributions to British botany were brought to a close in 1879, on his departure for Ceylon to become director of the Royal Botanic Gardens, Peradeniya.

In Ceylon, Trimen will always be remembered as the author of the monumental "Handbook to the Flora of Ceylon". This work, dealing with nearly 2,800 species of flowering plants in more than a thousand genera, was planned on a generous scale following the arrangement of the "Flora of British India". It was the result of much preliminary research into the Island's flora and the history of its investigation, from the work of Hermann in the seventeenth century and the publication of Linnæus's "Flora Zeylanica" in 1747, to the appearance of Thwaites' "Enumeratio" in 1864. The first volume of the "Handbook" appeared in 1893 and the author himself completed two more volumes in his life-time, covering the dicotyledons from the families Ranunculaceæ to Balanophoraceæ, inclusive. The remaining families of dicotyledons, with the monocotyledons and cycads, were covered in two more volumes by Sir J. D. Hooker, working in part from Trimen's notes. The Flora, thus completed in five volumes by 1900, was revised and extended in A. H. G. Alston's supplementary volume issued in the same format in 1931.

Trimen's work for Ceylon botany in its widest aspects was not confined to the systematic examination of the country's flora: his labours are also commemorated to no small extent in the comprehensive collections and spacious arrangement of the world-famous Gardens of which he was the director. In his official capacity he also took a prominent part in developing the Island's important tea and rubber planting industries, and in introducing many of its fruits and other exotic agricultural products. He retained all his old interest and pleasure in the society of other botanists, and from time to time welcomed to Peradeniya such eminent visitors as F. O. Bower, K. Goebel, G. Haberlandt, M. C. Potter, J. B. Farmer, F. W. Keeble, and others. In fact, while on leave in England in 1886, he was in part instrumental in obtaining from the British Association a grant towards equipping a laboratory at Peradeniya at which British and other visiting botanists were provided with facilities for their work.

Trimen died on October 16, 1896, having returned to Ceylon from leave in the previous year, against the entreaties of all his friends. He had by then become totally deaf and was also paralysed in one leg. He died, as he had lived, in single-hearted devotion to his work, almost his last moments of consciousness being occupied with attempts to write a few notes in continuance of his "Flora". His end has been most movingly described in the memoir by James Britten in the *Journal of Botany* for that year. In the country of his adoption, Trimen's early death was felt alike as a great loss to tropical botany and as the passing of a friend to all sections of the Ceylon public. Of him it could be said, in the words of the writer of a later commemorative article published in the Ceylon *Tropical Agriculturist*, that "a more obliging official, more attentive correspondent, or more pleasant friend and genial man than Dr. Trimen never came to Ceylon".

OBITUARIES

Prof. J. M. Macfarlane

PROF. JOHN MUIRHEAD MACFARLANE, emeritus professor of botany in the University of Pennsylvania, died at his home in Philadelphia a few weeks ago. He was born in Kirkcaldy in 1855, and his work was over more than twenty years ago. One or two old friends still remember him when he and they were boys in Edinburgh, where he learned his botany from "Woody Fibre" and from Alexander Dickson, and became one of Bayley Balfour's first assistants. It was under Balfour's influence that he wrote his once well-known paper on the minute structure of plant hybrids, which remained perhaps his chief work to the end. It was a careful comparison, within the histological limitations of its day, between the tissues of various hybrids and their parents, in such curious cases as the so-called *Philageria* (that is, *Lapageria* × *Philesia*) *Veitchii*, and the famous 'graft-hybrid', *Cytisus Adami*. This investigation led to his first appointment in the University of Pennsylvania in 1892, and gained him the Banksian Medal of the Royal Horticultural Society a little later on. His old master Dickson had been interested in pitcher-plants, and the Edinburgh Garden was rich in these, including the rare little Cephalotus and many hybrid Sarracenias and other things. Macfarlane had a note in NATURE on honey-glands in pitcher-plants, nearly sixty years ago. Long afterwards he did the pitcher-plants for various Floras, including those of British North Borneo and of New Guinea, and he wrote the chapters on Nepenthes, Sarracenia and Cephalotus for Engler. He was a very faithful and a very industrious man. D'ARCY W. THOMPSON.

Capt. R. D. Williams

CAPT. R. D. WILLIAMS, officer in charge of clover breeding and other investigations at the Welsh Plant Breeding Station, died very suddenly while on advisory work in Carmarthenshire on October 7. He was fifty-four years of age and had been a member of the Welsh Plant Breeding staff since October 1920. His genetical work on *Trifolium pratense* in particular is well known through papers published in the *Journal of Genetics* and elsewhere, while on the more immediately practical side the Aberystwyth strains *S.*123 red clover, *S.*100 white clover and others bred by him are already grown and appreciated in Great Britain.

WE regret to announce the following deaths:

Dr. Edwyn Bevan, O.B.E., F.B.A., lecturer in Hellenistic history and literature in King's College, London, during 1922–33, on October 18, aged seventy-three.

Dr. W. H. Hatfield, F.R.S., technical research director of Thomas Firth and John Brown, Ltd., on October 17, aged sixty-one.

Sir Michael Sadler, K.C.S.I., C.B., formerly master of University College, Oxford, and, during 1911–23, vice-chancellor of the University of Leeds, on October 14, aged eighty-two.

Prof. Pieter Zeeman, For.Mem.R.S., formerly professor of physics in the University of Amsterdam, aged seventy-eight.

NEWS and VIEWS

British Drug Houses: Dr. Francis H. Carr

REFERENCE was made in NATURE of October 16 to the resignation of Mr. C. A. Hill as chairman and managing director of British Drug Houses, Ltd. Dr. Francis H. Carr has succeeded him as chairman of the firm. Dr. Carr has had wide experience in the fine chemical industry. He was educated at Whitgift School and Finsbury, where he was one of the first holders of a Salters Company's fellowship. He started his practical experience with Burroughs Wellcome, working with them during 1898–1914. He was with Messrs. Boots at Nottingham during the War of 1914–18 when he took an active part in producing for the first time in England certain chemicals which had hitherto been a foreign monopoly. In 1919 he joined British Drug Houses, Ltd., and has done his full share in bringing that company to its present eminence. Apart from his active business career as a technical chemist, Carr has been a leader in all that concerns the progress of chemistry in the outside world and unsparing in his efforts to put the profession on a high level. He has served as chairman of the Association of British Chemical Manufacturers and president of the Society of Chemical Industry, and has been active in innumerable other ways known to his colleagues.

Gift to the Royal College of Surgeons of England

THE destruction of the greater part of the historic Hunterian Museum of the Royal College of Surgeons of England by enemy action in May 1941 was a grievous loss of a national treasure house. This loss, however, has been a spur to the College to build up a worthy successor of the old collection. From the first it was determined that its Research Department, engaged in fundamental research work necessary for future surgical progress, should not be hampered in its work. This decision was followed immediately by a generous gift from the Bernard Baron Trustees to endow the chair of experimental surgery and so release general College funds for the reconstruction work. Now, when plans are being made for the restoration of the Museum, comes the news that two further gifts each of £100,000 from Mr. W. H. Collins have been made to endow the Departments of Human and Comparative Pathology and of Human and Comparative Anatomy. One of these gifts, that to the Pathological Department, is to be immediate, the other to mature after the death of the donor.

Mr. Collins in his letter announcing the gift to the president of the College, Sir Alfred Webb-Johnson, wrote: "Throughout my career I have realized how

essential is the study and investigation of basic problems. Success of armies in the field is dependent on careful planning and preparation at headquarters, and victories in the war against disease can only be achieved by due application and increased knowledge of the fundamental medical sciences". No better dedication of a gift could be written and no better purpose could be served than to encourage the patient labours of those who lay surely the foundations on which others build. It is significant too that the donor expresses the hope that "the gifts will enable the Council to proceed with confidence with their responsible task and to engage the services of men of outstanding ability to assist them in their labours". In the post-war world of medicine in Great Britain the College will indeed have a unique place. Apart from its primary task of testing the fitness of those who aspire to practise the art and advance the service of surgery, it will have a special function in providing a link between the laboratory sciences and the treatment of the sick. Perhaps, too, in the future it will aspire to develop a hospital where discoveries at the laboratory bench will become quickly the triumphs of the hospital ward, and where the perplexing problems of disease will be brought rapidly to the attention of the laboratory worker. Cross-fertilization of ideas between laboratory and ward has already, in the association of the Rockefeller Hospital with the Rockefeller Institute in New York, produced advances in the science of medicine which have been of lasting benefit to suffering humanity.

Mr. Collins has been for many years a generous benefactor to hospitals in Great Britain, but his latest gift, far from benefiting but a few hospitals, will help to provide that new knowledge which is the free gift of medical research to all mankind.

Preservation of Museums in Italy

REPLYING to questions in the House of Commons, Sir James Grigg, Secretary of State for War, stated that an adviser is being appointed to deal with archæological questions such as measures for the protection and conservation of ancient monuments and works of art in countries occupied by British troops. Meanwhile British and American experts are already in occupied territory engaged in the supervision and protection of ancient monuments, museums, etc. The British officers sent or provisionally selected are from the British Museum, Inspectorate of Ancient Monuments (Ministry of Works), National Gallery and the Royal Institute of British Architects. Lists of æsthetic and ancient monuments have been prepared in Great Britain, and detailed instructions supplied to these officers regarding closing, guarding and, where necessary, repairing museums and similar institutions. Italian curators and their staffs, where suitable, are to be retained. In this connexion it is interesting to read Dr. G. B. Bidder's letter in *The Times* of October 14, in which he states that the aquarium in the Villa Nazionale of Naples, and so presumably the famous Stazione Zoologica Internazionale, is safe. Dr. Bidder adds that so lately as last August, the director, Dr. Reinhard Dohrn, was still in charge of the Station.

Anthropological Aspects of the Origins of War

A STUDY of the origin of war and its various manifestations from an anthropological point of view, by J. R. Swanton, of the Bureau of American Ethnology, which has been issued by the Smithsonian Institution in the War Background Studies series (No. 12), indicates the impossibility of separating the consideration of wars between tribes or nations from disturbances internal to them. Reviewing the various motives which lead to war and comparing warfare in simple and in advanced societies, Mr. Swanton emphasizes the relations between motives governing the individual and those which result in collective hostilities. These and further considerations of group controls, international relations, the effect of warfare upon trade and the place of the military establishment in the national life, lead to the conclusion that war is an expression of man's anti-social tendencies; and just as individual and collective crimes have to be controlled within the State by men trained and equipped to meet them, so the destructive threat represented by foreign armed forces when used for aggression must be countered by armed forces prepared to meet them. Between many nations there is a constantly increasing tendency to settle differences by peaceful means, and if these areas of law and of good feeling continue to spread, the preservation of order will pass more and more to the police, or to armed forces acting in that capacity. Consideration of the origins of war and attitudes towards it among different people shows that collective pugnacity is an acquired trait—cultural not biological. Fear and not hatred is the underlying if not the dominant motive, and when this fear can be allayed, belligerency will disappear with it. There is no mystery about the force required to terminate warfare. All that is needed is the will to do so.

A National Administrative Staff College

A SHORT statement, "A National Administrative Staff College", has recently been issued as a contribution to discussion by the members of a group which during the past twelve months has been studying this topic (honorary secretary, N.A.S.C., Norwich House, Southampton Place, London, W.C.1). The proposal is to found such a College to investigate and to expand the technique of organization and administration in civil life. To it will be admitted men and women aged about 28–34 who have shown ability and capacity in their particular spheres, including not only Civil servants, but also local government officers, men from industry and commerce, trade union officials and members of trade associations and professions such as medicine, the law, the Church and education. In addition to training such executives, the College will aim at promoting a better understanding of the inter-relation of the activities of the organizations from which its students are drawn, and it should also provide a centre for research into all aspects of administration. The curriculum will include a close study of the fundamental principles on which sound administration must be based, and an introduction to the many disciplines of which students must make use in their subsequent work. The whole course will emphasize the responsibility of leadership and the importance of correct practice in dealing with the central issue of human relations. The College will also endeavour to nourish the other qualities required in a leader—moral courage, judgment, energy, imagination. Probably not more than a quarter of the time will be devoted to formal instruction, and the fullest use will be made of modern methods such as the 'case' method. Fees per student

would be about £30 per month, including living expenses and tuition. The group has already in draft a memorandum and articles of association, and is prepared to incorporate the College and to form an initial court of governors.

Eratosthenes and the Circumference of the Earth

IN *Sky and Telescope* of September, under the heading "Saluting an Astronomer", Joseph R. Habes has an article which describes the method adopted by Eratosthenes for measuring the circumference of the earth. He knew that the sun threw no shadow at the summer solstice at Syene (the modern Assuan) and at the same hour at Alexandria the pointers of the sundials threw shadows, because Alexandria is north of Syene. He found that the arc of the shadow in the hemispherical bowl of the sundial was 1/50 of its circle, and hence concluded that the arc of the earth between Syene and Alexandria, which was 5,000 stadia, was 1/50 of the great circle of the earth. By this means he found that the circumference of the earth was 250,000 stadia, according to Cleomedes, but Strabo says that it was 252,000 stadia. A discrepancy arises when we come to consider the length of the stadium. The Greek stadium was 606·75 ft., and if Eratosthenes used this he was obviously very much in error in his computation. On the other hand, Pliny in his "Naturalis Historia" claims that Eratosthenes made 40 stadia equal to the Egyptian *schoinus*, and if this be so, taking the *schoinus* as 12,000 royal cubits of 0·525 metres each, the length of the stadium was 516·73 ft. If we accept the account of Strabo that Eratosthenes measured the circumference of the earth as 252,000 stadia, the circumference would be 24,662 miles, and the polar diameter 7,850 miles—only 50 miles short of the true polar diameter. This is considered to be one of the first great triumphs of scientific calculation.

Association of Scientific Workers : Scientific Film Group

IN view of the rapid increase in the applications of photography in science and industry, the West Midland Area of the Association of Scientific Workers has formed a Scientific Film Group. By means of lectures, exhibitions and news letters containing abstracts of recent publications, the Group will provide information for scientific workers using photographic techniques in industrial processes and research laboratories. The Group will also foster interest in the manifold applications of photography. It has already set up an information service able to provide expert advice on all aspects of photographic technique. The Group will endeavour to meet the demand of the general public for good-quality scientific films covering the whole field of science and technology. Monthly film shows will be held in Birmingham throughout this winter. The first show will take place in the middle of November. In the future the Group intends to produce original films and photographs. Applications for membership and inquiries should be addressed to Mr. H. Zerkowsky, Rowney Green, Nr. Alvechurch, Worcs.

Early Scientific Works

CATALOGUE 8, recently published by Davis and Orioli of 1 St. Martin's Street, Wallingford, Berks, contains a collection of 143 items printed before 1500. In addition to works on theology, philosophy and literature, heraldry and cookery, science and medicine are presented by the following works, among others : Albertus Magnus, "De secretis mulierum" (*c.* 1500); Aristotle, "De numero Partium" (*c.* 1490); Bartholomoeus Anglicus, "El libro de proprietatibus" (1494); Capillutus, "De curatione pestiferorum" (*c.* 1487); Celsus, "De medicina" (1497); Decembrius, "De Genitura Hominis" (*c.* 1495); Mesue's "Opera Omnia" (1497); Savonarola, "Practic in Medicina" (1498) and Silvaticus, "Opus Panectarum Medicinæ" (1498).

Announcements

DR. B. A. KEEN, assistant director at Rothamsted Experimental Station, will be absent from Rothamsted for approximately twelve months, acting as a scientific adviser to the Middle East Supply Centre, Cairo. He will report on the scientific and technical problems and resources (including personnel) in the area, and make recommendations on the establishment of a suitable organization, in the Middle East and elsewhere, to ensure the fullest practicable service of information and advice, with special reference to the post-war period. Dr. Keen will deal with agricultural resources and development and related problems, including education. He will be accompanied by Dr. E. B. Worthington, who will examine various non-agricultural matters. An American representative is expected to join the mission at a later date. The countries to be visited extend from Persia to Libya and from Turkey to the Sudan. It is hoped that the mission will be able to report by November 1944.

THE following appointments and promotions in the Colonial Service have recently been made: P. S. Hammond, agricultural superintendent, Gold Coast; D. K. McEwan Kevan, agricultural officer, Kenya; W. V. Rose, agricultural officer, Nyasaland; R. O. Williams, agricultural officer, Kenya; H. B. Atkinson, inspector of plants and produce, Gold Coast; G. G. Robinson, entomologist, Medical Department, Northern Rhodesia; N. S. Stevenson (conservator of forests, British Honduras), conservator of forests, Nigeria.

THE following appointments in the University of Sheffield have recently been made: Dr. A. I. G. McLaughlin (H.M. medical inspector of factories), honorary lecturer in industrial medicine in the Department of Public Health; Mr. P. E. H. Howarth and Mr. R. E. Peasegood, temporary demonstrators in anatomy; Captain J. H. Hale, assistant bacteriologist and demonstrator in bacteriology; Dr. Enid Bankier, demonstrator in zoology to medical and dental students; Mr. W. Davies, research assistant in refractory materials (in addition to his duties as temporary part-time assistant lecturer in geology).

THE British Association of Refrigeration, at its forty-fourth annual meeting, has decided to change its title to the Institute of Refrigeration, the change to take place on March 26, 1944. At the same time, the Association will establish a qualified class of technical membership attainable by examination on the lines of the major engineering institutions.

R. J. BRAIDWOOD has issued as a reprint from the "1943 Britannica Book of the Year" notes describing recent archæological work in Iraq, Palestine, Kenya, Morocco, England, etc. The notes form an excellent and useful three-page summary of British war-time discoveries and publications in the realm of prehistory.

LETTERS TO THE EDITORS

The Editors do not hold themselves responsible for opinions expressed by their correspondents. No notice is taken of anonymous communications.

Relation of Nucleotides and Nucleosides to Proliferation-Promoting Factors produced by Ultra-Violet Irradiated Yeast Cells

RECENT reports by Loofbourow[1] on the role of adenine nucleotides in wound hormone preparations from ultra-violet treated yeast cells prompt us to give a preliminary account of some of our experiments which bear upon the problem.

Adenine compounds were demonstrated to be present in the wound hormone preparations in the earliest studies[2], and the presence of guanine, although in smaller amounts, was also indicated[3]. On the basis of spectroscopic and chemical evidence, it was suggested that the purines were present in nucleic acid-like form, that is, as nucleotides. These findings were confirmed by Davidson[3] who showed the presence of purine nucleotides and nucleosides. Davidson also found a large amount of amino nitrogen. We demonstrated the importance of known yeast growth factors and amino-acids in the wound hormone preparations but showed that additional factors were also involved[4]. Loofbourow confirmed these findings[1].

In the present experiments, adenosine, guanosine and two samples of yeast adenylic acid were assayed alone and combined in concentrations up to 10 γ per ml. for their effect on the 24-hour yeast crop (*S. cerevisiæ*), using the previously employed[4] rocker-tube technique and Williams' medium[5] supplemented with inositol, thiamin, biotin, calcium pantothenate, pyridoxin, riboflavin, uracil, choline, acetylcholine, ethanolamine and nicotinic acid, as previously described[4], but substituting a casein hydrolysate for the amino-acid supplement. The nucleosides and nucleotides were also assayed in the presence of various amounts of a cell-free fluid from ultra-violet injured yeast suspensions. This fluid was prepared by washing 1·5 lb. of Fleischmann's bakers' yeast with 3 litres of distilled water, centrifuging, and resuspending in distilled water added gradually to a volume of 6 litres. The suspension was irradiated for 96 hr. with a quartz mercury arc during stirring and with the maintenance of constant volume. The suspending fluid was separated by centrifuging, followed by Buchner and Berkefeld filtration, and autoclaved, after which it was concentrated to convenient volume *in vacuo* and sterilized by autoclaving. Results of typical assays are shown in the accompanying table.

EFFECTS OF NUCLEOSIDES, NUCLEOTIDES AND 'WOUND HORMONE' ON GROWTH OF YEAST IN SUPPLEMENTED WILLIAMS' MEDIUM

24-hr. yeast crop, mgm. (dry wt.) per ml. (initial seeding, 0·03 mgm.).

Added substance (10 γ per ml. each)	Without wound hormone	With wound hormone	
		8·8 γ per ml.	140 γ per ml.
Medium alone (control)	1·05	—	—
Adenosine ($3·7 \times 10^{-5}$ *M.*)	1·14	1·30	1·84
Guanosine ($3·5 \times 10^{-5}$ *M.*)	1·11	1·32	1·66
Adenylic acid, I ($2·9 \times 10^{-5}$ *M.*)	1·03	1·35	1·79
Adenylic acid, II ($2·9 \times 10^{-5}$ *M.*)	1·04	1·35	1·75
Adenosine plus guanosine	1·41	1·53	1·73
Adenosine plus adenylic acid, I	1·33	1·47	1·79
Adenosine plus adenylic acid, II	1·26	1·44	1·79

Yeast nucleic acid (8 γ per ml.) was also tested but it was without effect and is not included in the table.

It is seen that adenosine possesses growth activity and yeast adenylic acid does not, confirming Loofbourow[1]. In addition, guanosine also possesses activity. Combination of adenosine with guanosine gives greater activity, as might be expected, but combination of adenosine with essentially inactive adenylic acid also gives increased activity. Addition of the wound hormone preparation, even in concentrations of the same order as the added nucleosides and nucleotides, produces additional growth. This probably means simply that optimum concentrations of the active substances were not present in the experiments reported and work is under way to ascertain whether this is so. The growth activity of the nucleosides accords with the finding of Englert[6] that yeast nucleic acid, normally inactive, acquires growth activity after subjection to alkaline hydrolysis.

Manometric studies were made, using 4 mgm. (dry wt.) of yeast per flask and adding the wound hormone preparation in quantities of 0·125–1 mgm. per ml. and the other substances in concentrations of 0·03–0·25 mgm. per ml. The wound hormone preparation caused a slight stimulation of oxygen uptake of yeast (10–20 per cent at the end of 1 hr.) in *M*/15 KH_2PO_4 containing 0·02 per cent glucose and in the supplemented Williams' growth medium, confirming an earlier observation[4]. The respiratory quotients, however, were lower than the control, even though the carbon dioxide output was raised in the latter medium. This appears to differ from Loofbourow's finding[1], but experimental conditions were probably different. The samples of yeast adenylic acid very slightly stimulated respiration in both media but did not raise carbon dioxide output in phosphate and raised it only slightly in Williams' medium, so that the R.Q. (respiratory quotient) was slightly lowered. Adenosine and guanosine had a slightly depressing effect on both oxygen uptake and carbon dioxide output in phosphate and caused a slight lowering of the R.Q. In Williams' medium both oxygen uptake and carbon dioxide output were stimulated somewhat, with the R.Q. scarcely affected in the case of guanosine and slightly raised in the case of adenosine. Yeast nucleic acid was essentially indifferent. All metabolic effects were relatively small. The R.Q.'s in phosphate on the whole were slightly above 1, while in Williams' medium, with an abundance of sugar, they usually ran in the neighbourhood of 6–7. We have shown previously that the oxygen uptake of our yeast is relatively unaffected by most of the bios components and amino-acids present in supplemented Williams' medium[4,7].

We have not had available a sample of adenosine triphosphate (ATP) and therefore have not been able directly to confirm Loofbourow's results[1]. However, in preliminary experiments which we are extending, we have applied a modification of Lohmann's fractionation procedure[8] to our wound hormone preparations. Assayed in unsupplemented Reader's medium the ATP fraction showed definite growth activity, as did the arginine phosphate and residual fractions. They all showed less activity than the parent extract, as would be expected from the previous findings and the assay conditions. Owing to the ease of hydrolysis of adenosine triphosphate it seems likely that our wound hormone extract would contain relatively small quantities of it as such. From the experiments it seems evident that fragments of the ATP molecule

are active, and it may be that the phosphorylated adenosines (and guanosines ?) occupy a unique place in the control of growth, as suggested recently by Potter[9].

Recently, Leonian and Lilly[10] have stated that the yeast growth activity commonly attributed to unknown factors in yeast and tissue extracts is non-existent and may be duplicated by adding greatly increased quantities of certain members of the vitamin B complex (notably inositol, biotin and pantothenic acid) to the medium. In partial confirmation of this we find that tripling the quantities of these vitamins in our medium (that is, using per ml. inositol, 300 mgm.; calcium pantothenate, 360 γ; and biotin, 1·2 γ) raises our 24-hr. yeast crop from 1·05 mgm. to 1·6 mgm. in a typical experiment. However, further addition of the wound hormone preparation in quantities of 0·14 mgm. per ml., 0·2 mgm. per ml., and 0·56 mgm. per ml., gave respectively crops of 2·04 mgm., 2·28 mgm., and 2·46 mgm. Discussion with Dr. Lilly suggests that the difference between his finding and ours lies in the yeast growth period. In the 72-hr. period used by Leonian and Lilly the vitamins appear to obliterate the effect of other substances in the wound hormone and other extracts. This is not evident in the 24-hr. period used by Loofbourow and by us. It would thus appear that the additional proliferants (presumably nucleotides and nucleosides) in our preparations affect primarily the rate of yeast proliferation rather than the ultimate crop. This is also indicated by data of Loofbourow[1]. Experiments will be carried out to confirm this.

In summary, the nucleosides adenosine and guanosine, alone or combined with each other or with yeast adenylic acid, exert growth effects on yeast. Such substances, together with known growth factors, would seem to be present in wound hormone preparations from ultra-violet injured yeast cells. These substances exert a slight direct metabolic effect on yeast as observed manometrically. It is probable that these substances exert their effect on rate of yeast proliferation rather than on ultimate crop.

We wish to thank Sr. Mary of Lourdes McDevitt, I.H.M., for technical assistance, and Dr. C. N. Frey of the Fleischmann Laboratories for gifts of adenosine, guanosine and adenylic acid. The other sample of adenylic acid was purchased from Hofmann–La Roche as "adenosine phosphoric acid".

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CORNELIUS W. KREKE.
SR. THOMAS MARY WALSH, *O.P.*
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Sept. 6.

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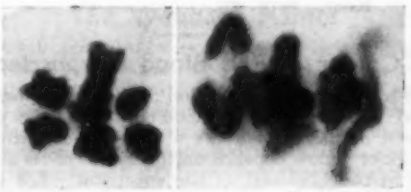
[9] Potter, V. R., A.A.A.S.—Gibson Island Conference on Chemical Growth Factors, August 2, 1943.
[10] Leonian, L. H., and Lilly, V. G., *J. Bact.*, **45**, 191 (1943).

Chemical Nature of Chromosomes

THE staining properties of chromosomes have hitherto been regarded as due to their content of nucleic acid. Recently, however, Stedman and Stedman[1] have demonstrated the presence in animal chromosomes of a new protein, chromosomin, which they have shown not only to be the principal component of the chromosomes but also responsible for their staining properties. Part of their proof depended on the demonstration of the fact that when chromosomin, isolated from animal nuclei, is introduced into the dye solution formed by the interaction of hydrolysed deoxyribose nucleic acid and Feulgen's reagent (a solution which I propose to term 'developed nucleal stain'), it takes up the dye in exactly the same way as do the chromosomes. It is clear that if the Stedmans' interpretation of the mechanism of the normal Feulgen technique is correct, it should be possible to stain chromosomes directly with the developed nucleal stain. That this is the case is shown by the results, illustrated in the accompanying photomicrographs, which I have obtained with this stain on plant cells. This result provides confirmatory evidence of those of the Stedmans.



a *b*

FIRST METAPHASE, (*a*) POLAR, (*b*) LATERAL VIEW, IN POLLEN MOTHER-CELLS OF CERTAIN SPECIES OF ALLIUM (FIXED IN ACETIC-ALCOHOL) STAINED WITH DEVELOPED NUCLEAL STAIN. × *c.* 1800.

The new process has certain advantages over other nuclear stains. A simple technique has been developed for its use, the details of which will be published elsewhere.

My thanks are due to Dr. E. Stedman for placing at my disposal the new stain and for his friendly co-operation.

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Sept. 28.

[1] Stedman, E., and Stedman, E., NATURE, **152**, 267 (1943).

A New Rapid Method for Penicillin Assay

VARIOUS methods of testing penicillin are in use in different laboratories, and while the accuracy of some of them is quite high, they all suffer from the disadvantage that some 12–18 hr. are required to obtain a result of any accuracy. Such a time-lag is a serious disadvantage in studying the production of penicillin—as the rapid change of *p*H which occurs under certain conditions makes it essential that harvesting should be carried out with the least delay if serious loss of activity is to be avoided.

The test outlined below, which has been in use for some time in these laboratories, has, in addition to its speed, other advantages. It is economical in space and materials, sterile technique is unnecessary

and its accuracy appears to be as great as any other test. The test is based upon the inhibition by penicillin of the growth of a suitable group A β-hæmolytic Streptococcus—a 5 per cent suspension of washed sheep cells being used as an indicator. The penicillin to be tested is diluted to about 1 unit per ml. From this dilution quantities 0·20–0·10 are measured in 10 per cent steps, by means of a micrometer syringe, into 8 cm. × 1 cm. tubes containing 1 ml. of nutrient broth. To each tube is then added 0·2 ml. of a suspension of 500–700 × 10^6 organisms per ml. and 0·8 ml. of sheep cells. The tubes are then mixed by invertion and incubated in a water bath at 37° C. for approximately 3–3½ hr. They are then centrifuged and read for hæmolysis. A suitable standard and controls are included with each rack of tests.

The most critical factor in this test is the maintenance of the culture in a suitable state so that the suspension of organism does not contain any preformed hæmolysin. This is achieved by growing the culture on plain agar—and washing off with broth immediately before use.

URSULA WILSON.

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Kent. Sept. 29.

Colour of Red Blood Corpuscles

IN a recent communication[1], Dr. J. R. Baker has asked why a single red blood corpuscle looks yellow instead of pink. Whether a thinned-out red colour is pink or yellow depends on the extent of its absorption in the blue end of the spectrum. Let us for simplicity regard white light as composed of equal parts of red, green and blue. Imagine two coloured substances with extinction coefficients as follows:

	Extinction coefficients		
	Red	Green	Blue
Substance 1	0·3	0·7	0·7
Substance 2	∞	0·7	7·0

At a certain thickness substance 1 transmits 5 per cent red, 0·1 per cent green and 0·1 per cent blue, while substance 2 transmits 5 per cent red, 0·1 per cent green and 0·00 per cent blue. At such thicknesses and above both substances transmit so little green and blue as to be red in colour. At a thickness about one fifteenth of this the proportions transmitted are—substance 1: 74 per cent red, 67 per cent green and 67 per cent blue; substance 2: 74 per cent red, 67 per cent green and 0·1 per cent blue. The colour of the first substance is 201 parts white (equal parts red, green, blue) and 7 parts red, that is, pink, while that of the second is composed of red and green which additively combine to give the sensation of yellow. If a different light source having a different red : green : blue ratio is used the tints will naturally be modified. The yellow colour of red blood corpuscles seen singly merely indicates the presence of a substance of high extinction coefficient in the blue region of the spectrum. The identification of a coloured substance is more satisfactorily made on the basis of its *absorbing* rather than on its *transmitting* qualities.

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Sept. 18.

[1] NATURE, 152, 331 (1943).

THE fact to which Dr. Baker directs attention can be readily understood if the absorption spectrum of hæmoglobin be considered in its entirety. In all the text-books attention is concentrated on the characteristic absorption bands in the yellow and yellowish-green, and the lower end of the spectrum is neglected. The very strong absorption in the violet, which helps to determine the colour of hæmoglobin at all concentrations, has therefore escaped the notice of many men of science.

A strong solution of oxyhæmoglobin absorbs completely all rays below the orange-yellow (585 mμ) and transmits nearly completely all those above it. The boundary (which corresponds to the upper margin of the α absorption band) is very sharp. The colour of such a solution is intense scarlet; on progressive dilution it changes through vermilion to a somewhat dull orange, and eventually to the pale straw-yellow of a single corpuscle under the microscope. The changes in the absorption spectrum that accompany these changes of colour are as follows. First a dim zone of transmission appears in the green, at about 505 mμ; its upper limit (the lower margin of the β band) is fairly sharp, but on further dilution its lower limit advances steadily through the blue-green and turquoise. Simultaneously with this extension a transmission zone in the yellow-green (560 mμ) appears, separating the α from the β band. The bands then become thinner and fainter, but at this stage absorption below the mid-blue (470 mμ) is still almost complete; and even at very high dilutions, when the β band is invisible and the α band very faint, absorption in the violet, below 425 mμ, is quite conspicuous.

Roughly speaking, therefore, one may say that a dilute solution transmits all but the violet and ultramarine; a solution of medium strength transmits the red, orange and much of the green and blue-green; and a strong solution only the red and orange. It is easy to understand that these will appear respectively pale yellow, moderate orange and intense scarlet.

Reduced hæmoglobin shows, as is well known, a single absorption band in the yellow-green, instead of the two of oxyhæmoglobin. This has scarcely any effect on its colour; its cherry-red hue at moderate dilutions, instead of the orange-vermilion of oxyhæmoglobin, is due to its much less vigorous absorption of the blue rays. But absorption in the violet is extremely strong, so that very dilute solutions have the same pale yellow colour as those of oxyhæmoglobin.

If, instead of diluting the solution, the depth of it through which the light passes is decreased, the results are exactly the same. It may be true of some dyes, as Dr. Baker says, that change of colour on dilution arises from molecular dissociation; but in most cases the explanation is analogous to that just given for hæmoglobin. This phenomenon of dichroism is much more widespread than is generally supposed. The most striking cases, such as chlorophyll and chlorocruorin, are well known; but the changes in hue on diluting methylene blue or copper sulphate (shift towards green) or erythrosin (shift towards orange) differ only in degree. Safranin, gentian violet, Bismarck brown and malachite green, which are respectively scarlet, violet, orange-brown and blue-green at moderate dilutions, are all deep ruby-red in concentrated solution.

The importance of dichroism in interpreting the results of colour tests on a microscopic scale is, as

Dr. Baker suggests, very great. Such tests should always be performed first on a macroscopic scale, with the concentration of one of the reagents low enough for the colour generated to be only just perceptible. If the coloured substance formed is dichroic there will be a change in hue as well as a decrease in intensity of colour, and a similar change may be expected on a microscopic scale.

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Dublin. Sept. 21.

High-Angle Edge Flaking of Flint

THE communication by Mr. J. Reid Moir on this subject in NATURE of July 17 raises some interesting points.

The flint knappers of Brandon for more than a century past have severed their gun-flints from the parent flake at an obtuse angle platform-scar varying from 120° to 150°. Their blows, however, were delivered with an iron hammer on a flake held down on an iron anvil. The use of a punch enables a regular series of short scars to be formed at an angle of about 120°, as may be seen from the lateral edges of Danish axes. My own experiences in removing flakes by direct percussion forming platform-scar angles up to 140° were published in 1938[1].

Mr. Moir rightly states that the detachment of such flakes requires a heavy blow on a large nodule of flint. Palæolithic man apparently rarely used such blows, and usually only on the butt end of thick implements. Out of 1,800 measurements of platform-scar angles made in eighteen different human industries, only twenty scars were found with angles of 110° or more, or 1·1 per cent of the total. At the same time the percentage of angles of 90° and more varied from 0 to 18 per cent in the different industries, all the remaining angles being acute.

In flaked flints from Eocene deposits the percentage of high-angle flake-scars of 90° and more varies from 54 to 62 per cent. The age of these deposits rules out percussion by human agency.

In flaked flints of later Tertiary age from Puy Courny, the Kent Plateau, and below the Crag of Norfolk and Suffolk, the percentage of high-angle flake-scars of 90° and more varies from 62 to 70 per cent.

The high proportion of high-angle scars in the Tertiary flints contrasts sharply with the paucity of high angles in the human industries, and suggests that the Tertiary flaking was due to soil movement under pressure arising from solifluxion, foundering, or ice action. Laboratory experiments confirm the facility with which high-angle flake scars can be produced by rotating a flint edge under pressure against a hard surface.

ALFRED S. BARNES.

Dormers, Holwood Park Avenue,
Farnborough, Kent.

[1] Barnes, A. S., *L'Anthropologie*, **48**, 222 (1938).

Identification of Male Schistosomes in Uncommon Sites

IN view of the difficulty of identifying adult schistosomes except by the shape of their *ova*, the presence of adult males in a site where only one species is known to occur strongly supports the opinion that the worms may belong to that species, even though easily identified adults belonging to another species are present in the same host.

Two adult male schistosomes were found[1] in a puppy's eyelid after it had been treated with cercariæ, some of which developed into typical adult examples of *Schistosomum hæmatobium* in the liver. These had probably migrated from the liver as the adults of *Schistosomum spindale* are wont to do before accumulating in the nasal veins.

Although nasal schistosomiasis has not been reported in South Africa, ova typical of *Schistosomum spindale* are found either entirely alone or in combination with *Schistosomum hæmatobium* ova in the human subject and the larvæ have been recorded in pond-snails[2], but variation in the number of testes in the adult males renders their identification difficult.

F. GORDON CAWSTON.

Britannia Buildings,
West Street,
Durban. July 24.

[1] Cawston, F. G., *J. Trop. Med. and Hyg.*, **28**, 406 (1925).
[2] Porter, Annie, "The Larval Trematode found in Certain South African Mollusca with special reference to Schistosomiasis (Bilharziasis)" (1938).

The Welsbach Mantle

A THIN platinum wire immersed in flame gases acquires a temperature far greater than that corresponding to the mean molecular translational energy of the gases. The explanation appears to be that an abnormal dissociation exists in flame gases and that the products of the abnormal dissociation combine upon its surface[1,2]. This perhaps throws light upon the problem of the luminosity of the Welsbach mantle. A mixture of ceria and thoria in the Welsbach mixture proportions is an effective catalyst in the combination of hydrogen and oxygen[3], and it seems probable that when a mantle is immersed in flame gases high temperatures are reached at the active centres on its surface.

There is little or no abnormal dissociation in flame gases resulting from the combustion of over-rich inflammable mixtures[1,2], and it is of interest to note that the Welsbach mantle loses its selective radiating properties when placed in the reducing part of the flame[3]. The experiments of Nichols with niobium oxide show similar results[3].

W. T. DAVID.

Engineering Department,
University,
Leeds. Sept. 29.

[1] "The Abnormality of Flame Gases", *Proc. Inst. Mech. Eng.* (In the press).
[2] NATURE, **152**, 278 (1943).
[3] Minchin, *Trans. Faraday Soc.*, **35**, 163 (1939).

Bulb Correction in Capillary Tube Viscometry

IN a recent letter[1] Mr. A. C. Merrington points out that, when a material for which the viscosity decreases greatly with increase in rate of shear is investigated in a capillary viscometer, the resistance offered by the bulbs is a greater fraction of that offered by the capillary than when a true fluid is tested in the same apparatus. He thinks it possible that in some cases where anomalies have been reported in the relationship of flow-rate to capillary

radius, the results can be completely accounted for by neglect of the bulb correction. He also thinks that in other instances it has influenced the results without being the whole cause of the observed anomalies.

The need for determining or eliminating bulb correction in accurate capillary tube viscometry is obvious. In the paper in which the radius anomaly known as the 'sigma' phenomenon was first described[2], we wrote:

"For this more accurate work with larger bulbs it becomes necessary to correct the pressures for the resistance offered by the bulbs themselves. For this purpose the bulbs are connected directly with one another, and the pressures corresponding to a series of volume-flows are measured. By graphical intrapolation the correction, P_b, corresponding to each volume-flow can be estimated. As no appreciable increase in resistance is caused by introducing a few millimetres of narrow tubing between the bulbs, it may safely be concluded that no kinetic energy correction is necessary with these measurements".

We should be surprised to find that neglect of bulb correction has been a serious cause of error in subsequent studies of the relationship of flow-rate to capillary radius, and we regard Mr. Merrington's suggestion as rather misleading.

R. K. SCHOFIELD.

Rothamsted Experimental Station,
Harpenden, Herts.

G. W. SCOTT BLAIR.

National Institute for Research in
Dairying,
Shinfield, Near Reading, Berks.
Sept. 16.

[1] Merrington, A. C., NATURE, 152, 214 (1943).
[2] Schofield, R. K., and Scott Blair, G. W., *J. Phys. Chem.*, 34, 248 (1930).

University of London External Examinations and the Technical Colleges

WITH reference to E. B. Moullin's communication in NATURE of August 14, I should like to deal particularly with his statement that "All external examinations are abomination and an evil rot in an educational system". He cites as his chief authority for this point of view Prof. A. N. Whitehead. Prof. Whitehead was chairman of the Academic Council of the University of London in 1924 when I was chairman of the External Council, and he co-operated enthusiastically with me in creating a new department in external work. A sub-committee of the Academic and External Councils in July of that year brought before the Senate (March 27, 1924) a proposal for assistance to external students, which developed into what has become known as the "Advisory Service for External Students". Prof. Whitehead gave most generous help in the furtherance of this proposition, and it was his ardent advocacy that persuaded teachers (represented by the Academic Council) to give most disinterested and sustained support to the scheme, which was adopted by the Senate with only two dissentients. Prof. Whitehead continued to take the liveliest interest in the progress of the Service right up to the time of his resignation from the Senate to fill his new office at Harvard.

The Advisory Service has been in operation for nearly twenty years. Some of the most distinguished teachers in the University constitute a panel of advisers, and have given invaluable aid in preparing courses of study, furnishing guidance on authorities to be consulted, etc. The Advisory Service thus carried out by the closest co-operation between the two sides of the University of London received the special commendation of the Statutory Commission dealing with the reconstruction of the University in accordance with the University of London Act, 1926.

The part played by the external examinations of the University in raising the standard of teaching and achievement in university and technical colleges throughout Great Britain has been widely acknowledged by the colleges concerned, and in no faculty more wholeheartedly than in the faculty of engineering, to which the majority of technical colleges must be assigned. The encouragement thus given by the opportunity of sitting for external degree examinations in engineering has resulted in a steady multiplication of colleges throughout the country (now more than fifty in number), which have raised their standard of teaching to a level that allows of their recognition as institutions submitting candidates for London degrees.

If I understand Mr. Moullin's argument correctly, it is that every technical college should be sufficiently self-satisfied to disregard any outside valuation of its adequacy. Such an attitude does not show the humility which is surely one of the most authentic attributes of the truly scientific mind, and it is not endorsed by some of the most important university colleges in the provinces. Indeed, there is abundant evidence from many such institutions that the standard of their work has benefited by receiving the confirmatory hall-mark of unimpeachable authority afforded by the performance of their students in London external examinations.

In this connexion I may mention a tribute paid to the external side of the University of London by the late Frank Granger, vice-principal of Nottingham University College. He pointed out in a letter that lies before me that his own distinguished career had been rendered possible by the opportunity of taking an external degree at London, and he referred to the advantage enjoyed by his College which for more than fifty-four years had prepared students for London external degrees, and he mentioned that in the year 1935 in which he wrote, the fees paid by his students to the external side totalled more than £2,000, an authentic index to the volume of entries. He went on to say that other university colleges than his own were equally appreciative of the service rendered by London in this respect.

The service to higher education which the external side of the University of London fulfils may perhaps be gauged by certain figures.

In the latest list, given by the University Grants Committee, of students at Oxford, Cambridge and London, the following figures are furnished for 1941–42:

Oxford	2,723
Cambridge	3,245
London (registered external students) ..	10,799
" " internal " ..	9,162

The importance of the function discharged by the external system of examinations in fostering educational relations with our Dominions and Colonies was handsomely acknowledged by the President of the Board of Education (Lord Eustace Percy) in a memorable passage of his speech in the House of Commons on the Second Reading of the University of London Bill (Hansard, Nov. 19/26, col. 2122) with which I shall close this letter. Lord Eustace Percy said:

"It has been one of the great glories of the external

side that it has been a pioneer in the effort to make London in a very real sense an Imperial University, and that is the position which London must increasingly occupy. The demand for university education in this country from all our Dominions is growing every year; Oxford and Cambridge clearly cannot satisfy it. The University of London is clearly marked out as the University that can satisfy it."

E. GRAHAM-LITTLE.
(Chairman of the External Council, London University.)

House of Commons.

Importation of Technical Literature into Great Britain

ABOUT eight months ago, a copy of B. A. Soule's "Library Guide for the Chemist" was ordered for the Chemistry Library here, but so far the book has not arrived, presumably on account of its being an American publication. Everyone knows that in present circumstances, transmission of books from overseas must often be less rapid than in peace-time; could not some way be found, however, either to expedite transmission or to produce a limited edition of a useful work of this kind in Great Britain?

As most chemists are aware, almost all recent guides to the chemical literature are of American origin, and unfortunately few, if any, up-to-date British substitutes for these exist. Furthermore, on account of present conditions, many young chemists are being trained in a shorter time than is usual, and are being absorbed into industrial and other research laboratories without any previous research experience. This means that the training of these men in the full use of chemical literature can scarcely be adequately done at the university, and may, in extreme instances, be utterly neglected.

Since it becomes the responsibility of each man, after graduating, to continue to train himself in this technique—for without it he is defective as a research worker—it seems a matter of national importance that such aids as do exist should be made more readily available.

K. R. WEBB.
E. W. BALSON.
S. H. HARPER.
I. G. M. CAMPBELL.

University College,
Southampton.
Sept. 27.

Science, Christianity and Truth

IN NATURE of July 17 Prof. Julian Huxley directs attention to the misunderstandings of the scientific point of view involved in two passages from Rev. Hardwick's review of Canon Baker's "Science, Christianity and Truth". Surely these misunderstandings are in some measure due to the scientific man's habitual reluctance to state his own *credo*? In common with any other philosophical attitude, the scientific one must take its stand on some primary assumptions, whether they be regarded as beliefs or as merely postulates. Science assumes an objective universe external to an observer and that there is some real relationship between the sense reactions of the observer and the universe. These assumptions are implicit in the criterion of "arriving at truth rather than error" by the "correspondence with fact" to which Prof. Huxley refers. They are implicit, too, in the conception of evolution and all that is based upon it; among other things, a belief in an evolutionary trend towards betterment of some sort and in man's power of fostering and furthering that trend. Many scientific men hold these ideas and hold them as articles of belief rather than as mere working hypotheses.

Granted this, they have good ground on which to reply to the assertion with regard to their position in relation to liberty which Rev. Hardwick quotes with approval from Canon Baker's book. For evolution implies variation and variation implies liberty.

C. BERKELEY.

The Biological Station,
Nanaimo, B.C. Aug. 23.

James Prescott Joule and the Unit of Energy

PROF. ALLEN'S inquiries (NATURE, September 25, p. 354) confirm the conclusion reached by the late Prof. Lloyd James and reported in the *Radio Times* in February 1933. He found that twelve near relatives and friends of the man himself pronounced 'Joule' to rhyme with *cool*, six more distant relatives and friends rhymed it with *coal* and nine other friends rhymed it with *cowl*. On the other hand, among living bearers or friends of bearers of the name, the frequency was ten for *cool*, twenty-six for *coal* and thirteen for *cowl*.

Thus it may be assumed that in Joule's time in Manchester, the name rhymed with *cool*, but that the present tendency is towards *coal* (which, for the sake of those with a desire for precision, is, I suggest, an attempt to represent the pronunciation which phoneticians would write as dʒoul).

J. H. AWBERY.

11 Carlisle Road,
Hampton, Middx.

IF Prof. Allen can establish beyond doubt that Joule pronounced his name *jool*, not *jowl*, he will do lexicographers a valuable service. The pronunciation *jowl*, given in "Chambers's Technical Dictionary", was based on information obtained for our much older "Biographical Dictionary", so there is no question of its being a recent corruption. While giving the pronunciation *jowl* for the personal name in our "Technical Dictionary", we were careful to give the form *jool* for the unit, since inquiry among physicists showed that it is now universally pronounced so. Accordingly the "contradictory statements" appearing in Prof. Allen's extract from our definition are in reality a measure of our compilers' zeal. It is true that a literal error has crept into the definition, which we regret; but we stoutly disclaim the error of a century in Joule's birth date.

W. & R. CHAMBERS LTD.

11 Thistle Street,
Edinburgh, 1.

MAY I hope that the "jool" pronunciation of Joule's name will be adopted, if only in order to preserve the mnemonic:

"Old Dr. Joule he made this rule:
The self-same energee
Which lifts a gram of matter to
4 2 6 4 0 c. [centimetres]
Will heat a gram of water through
One centigrade degree."

This is due to the late Dr. T. C. Porter, of Eton College, and presumably gives the pronunciation current about fifty years ago.

J. B. S. HALDANE.

at Rothamsted Experimental Station,
Harpenden.

ASSOCIATION OF SPECIAL LIBRARIES AND INFORMATION BUREAUX

ANNUAL CONFERENCE

THE eighteenth annual conference of the Association of Special Libraries and Information Bureaux (ASLIB), following the precedent of the seventeenth conference last year, was held in the Royal Society's rooms at Burlington House on September 18 and 19. The attendance was considerably larger than in 1942, and at some sessions the accommodation generously provided by the Royal Society was barely adequate for the number present.

The report on the year's work presented to the annual general meeting on September 18, when Prof. R. S. Hutton was re-elected president, referred to a steady increase in membership to 390 as against 328 in 1942 and 297 in 1941. Although the Association's income has increased, the increase of expenditure due to such special activities as publications and the highly successful special library-training course initiated as a result of a suggestion at the 1942 Conference, has led to a small deficit, and the financial position of the Association was the subject of some keen discussion at the final session of the Conference on September 19, when Miss Ditmas, the general secretary, gave an informal paper on "Aslib: What it is Doing and What it Hopes to Do". The report also referred to the project for a Union Catalogue of Periodicals in British Libraries, the Index to Translations, and to the use made of the location indexes to current copies of European periodicals, as well as to the visit of the chairman of council, Mr. Edward Carter, to the United States at the invitation of the Rockefeller Foundation.

Following the annual meeting, the Conference opened with an address on "Information Services for the Scientist" by Mr. J. G. Crowther, of the British Council. Pointing out that the forces now being released by the application of science are such that scientific workers can no longer remain indifferent to the use made of their discoveries, Mr. Crowther urged that the social situation demands that the instruments of modern science should be handled with knowledge and judgment, not only by scientific men but also by the community as a whole. Accordingly the efficient organization and use of scientific information are among the chief problems of the day. Britain, he considered, can have no future as a first-class power unless she modernizes her scientific and technical resources; and in addition to making existing libraries as convenient and efficient as possible, plans should be prepared for an adequate national system of scientific and technical information. This is a necessary part of the development of an adequate national system of scientific and industrial research. Referring to his experience in the supply of information overseas regarding British contributions to science, Mr. Crowther commented on the need for better information services, on difficulties in dealing with bibliographic inquiries in science, and particularly on the need for carefully classified lists of books, coupled up with an index containing critical reviews. The centralization of abstracting services is also desirable; further, Mr. Crowther directed attention to the absence of any British Government medical library comparable with that of the Surgeon-General's Office at Washington. Medical literature, too, is in urgent need of rationalization, and after a reference to the proposals for an Institute of Scientific Information ventilated at the British Association Conference on "Science and the Citizen" earlier in the year, Mr. Crowther suggested that there are so many problems of first-class importance in connexion with the organization of science and the development of scientific and industrial research, from the national, the Commonwealth and the international point of view, that the appointment of a Cabinet Committee to study the matter and inspire the preparation of suitable plans is desirable.

The remaining sessions on September 18 were devoted to a symposium on the international rehabilitation of special library services. Mr. Theodore Besterman contributed to the first session, which was concerned primarily with the tasks and policy in library rehabilitation, a paper in which he proposed the establishment of an international library clearing house. The centralized collection and allocation of books in some such way would be a valuable contribution towards the systematic restocking of libraries, and Mr. Besterman referred particularly to the question of periodicals. Emphasizing the necessity of a plan which transcends national boundaries, Mr. Besterman stated that the ideas embodied in his paper are being considered by a United Nations Committee under the auspices of the British Council, with Prof. Ernest Barker as chairman. Prof. J. Timmermans followed with a paper on the restoration of the Belgian public libraries, and the ensuing discussion centred largely on the possibility of using the services of the National Central Library for the purpose in Great Britain, assisted by a proportionately larger Government grant, and on Mr. C. C. Barnard's proposals in a letter to the Press last July (NATURE, **152**, 106; July 24, 1943).

A paper by Mr. E. J. Carter was concerned with the technique of the problem, particularly that of special libraries and information bureaux. As a background to that technique he visualizes a fuller organization of academic life. In each country the primary division would be into national academies in which the user interests of science, history, the arts and education have their centres. These would be more than professional societies as we have them in Britain now: they would be the central organizing and initiating departments of the whole of each sphere of national life, and would be academies of working scientific men, etc. Each academy would have its documentation section responsible for seeing that its members are efficiently served in regard to the collection, processing and distribution aspect of such service. The national academies would be linked up with Continental councils, grouped so as to yield as large units as could be functionally efficient. Some such background, he considers, is essential in any scheme for improving the details of communication.

Mr. Carter then briefly reviewed some of the needs, such as the organization, first on a national scale and then an international scale, of the collection, processing and distribution of knowledge, of which Mr. Besterman's proposal was only one aspect. The essential point both in abstracting and in documentary reproduction is to co-ordinate and extend existing services rather than to create new. Finally, the operation of an efficient information service involves both the education of the personnel required for the services we have in mind and the education of our own special public. In regard to the former, the whole of the service must be adjusted to the

special needs of the studies and operations to be served, while in regard to the latter an information service which derives its life from its users either as contributors or as recipients is not a bureaucratic processing machine but a positive and creative element in national life.

These discussions were echoed in that following Mr. F. C. Francis' paper on September 19 on "The British Museum as a Special Library". Pointing out that the librarian cannot be content with cataloguing and classifying his stocks but must always be on the look-out for means to make his books known and to make them play their full part in the growth of knowledge, Mr. Francis explained how, broadly speaking, the British Museum has itself tended to specialize on subjects that might be roughly grouped as humanistic. It is the practice of the Museum to attempt to add to its collections 'English' books printed abroad, and also to buy books by outstanding writers, and really important books likely to be of historical importance in every field of knowledge. Scientific works published in the general proceedings of learned societies and academies, or in series, or as dissertations will, almost certainly, be found in the British Museum Library in complete ranges, as will the publications of foreign Governments, which again include works in all branches of study. Generally speaking, the collections are strong on the historical side of most subjects and weakest in modern foreign technical literature in non-humanistic subjects. Even here, Mr. Francis pointed out that of 112 items on pp. 226, 227 of the "World List of Scientific Periodicals", the British Museum has seventeen, the Natural History Museum Library five and the Science Library twenty-two, while of the seventeen, five are not to be found elsewhere. Similarly, out of 87 items on pp. 510–11, ten are in the Museum (and three only there), five in the Natural History Museum, and sixteen in the Science Library. Again, the Museum has no fewer than 111 items not included in the recent ASLIB List of Scientific and Technical Periodicals received from the U.S.S.R. during the period 1933–42. Finally, commenting on Mr. C. C. Barnard's suggestion, Mr. Francis urged that we should first carefully consider the place which each library, whether a national library or a special library, can take in a properly thought-out scheme devised to fulfil the tasks allotted to it as economically as possible. The organization of collecting so as to provide up-to-date, accurate and complete information on the subjects covered requires a measure of unified control if special libraries are not to be doing the same work, and he thought centralization rather than dispersal of our great reference library services should be the ideal.

At the following session, Major Irving J. Newman described the organization of American Photographic Information Services in Great Britain and included a showing of the film "Report from the Aleutians". The afternoon session of the Conference on September 19 was devoted to a discussion on the co-ordination of abstracting, at which Prof. R. S. Hutton presided. Referring to the earlier ASLIB discussions and inquiry on this question initiated in 1931, and to Prof. J. C. Philip's paper "Efficiency with Economy in Abstracting", Prof. Hutton suggested that the discussion should centre on such points as whether existing abstracting services adequately cover the delegates' field of interest, and whether there is duplication in their particular fields. If they run their own abstracting service, is that because existing services do not cover the field, are too slow or cannot cater for their special needs? Again, can a centralized abstracting service adequately serve their special field of interests or secondary interests indirectly related to their main field of research? The discussion was opened by Dr. S. C. Bradford, who put the case for a central abstracting service with his usual ability. Mr. King gave a brief statement of the steps already taken in regard to collaboration in the preparation of scientific abstracts arising out of the report of the British Commonwealth Science Committee. Despite a full discussion, it cannot be said that any tangible result was achieved. Most of those who participated appeared to be of the opinion that whatever centralized abstracting service may be organized, specialized abstracts will still be required to supplement it.

SCIENTIFIC STUDY OF THE AMARYLLIDACEÆ

THE American Amaryllis Society is again to be congratulated upon the publication of its ninth year-book "Herbertia" for 1942 (From the Society, Orlando, Florida, U.S.A. 3.25 dollars post paid). The Society, through its able editor Dr. Hamilton P. Traub, has brought together a large number of short contributions which deal with all aspects of the Amaryllidaceæ. Detailed descriptions of the Ixolirion tribe, with keys and descriptions of species, are given by Dr. Traub, and include chromosome data for *I. tartaricum*. The genus Crinum is also the subject of a comprehensive review by Dr. J. C. Th. Uphof. Suitable illustrations play a considerable part in the correct recognition of species, and Major Albert Pam of Broxbourne, England, has prepared an extensive check-list of coloured plates of amaryllids which have been published in the literature. A new species of Hemerocallis, *H. altissima*, is described by Dr. A. B. Stout, who also outlines the various stages in the breeding of a red-flowered day-lily. Starting with *Hemerocallis flava, H. aurantiaca, H. Thunbergii* and the Europa day-lily, hybridization and selective breeding produced the Theron class, with petals almost wholly red. Further breeding has made possible the introduction of bi-coloured flowers, and blooms with various geometrical arrangements of red upon a yellow ground.

Cytology of the genus Narcissus forms the subject of a paper by Dr. Abilio Fernandes of Coimbra, Portugal, who is a recipient of the Society's Herbert Medal. Chromosome numbers for fifty-seven species, varieties and forms, with information about the relative sizes of various pairs, are combined with more general considerations. Diploids, for example, do not grow on acid soils (pH 3·7–6·2), whilst hypotetraploids ($2n = 26$) can grow on soils of moderate acidity and on neutral and alkaline ones (pH 5·7–7·8). Cytological studies also reinforce the morphological subdivision of the genus into three groups. Some vitamins, hormones, pyrimidines and purines, with certain other substances, were found by Dr. F. T. Addicott to increase the percentage germination and tube-length of pollen grains of Milla sp. This fact should materially assist breeders to effect cross-pollination between varieties otherwise difficult of fertilization.

Virus diseases are also considered in the year-book. Earl Hornback lists the species of Narcissus in order of resistance to such maladies, placing *N. Tazetta* as

most resistant, with double forms, Poetaz and Poeticus varieties as most susceptible. L. S. Hannibal finds, however, that not many other genera of the Amaryllidaceæ are affected by mosaic diseases. Several factors in the propagation of alstroemerids are of scientific interest. Alstroemeria seeds, for example, must have sun before they will germinate, whereas seeds of Bomarea must be protected from the sun, according to Harry L. Stinson. L. S. Hannibal shows, among other factors, that in the further treatment of seedlings, alstroemerias must not suffer any crowding of the roots, otherwise flowers will not be produced. Vegetative propagation of Hemerocallis by crown cuttings has been further studied by V. T. Stoutemyer, who finds that the cuttings grow much faster and make greater weight if they are given six hours extra light each day, than in conditions of ordinary illumination.

Other aspects of practical culture, of harvesting, storage, forcing and of garden combination are dealt with in the volume.

It is difficult to escape the conclusion that knowledge of the horticultural science, genetics and taxonomy of the Amaryllidaceæ has advanced more than that of any other group during the last decade. Perhaps it is because "Herbertia" gathers together all the items into a connected whole, but there is also the specialist stimulus provided by a Society bent upon the encyclopædic study of a relatively small field which is replete with garden beauty, world-wide in origin and distribution, and full of scientific interest.

FORTHCOMING EVENTS

*(Meetings marked with an asterisk * are open to the public)*

Friday, October 22—Saturday, October 23

TOWN AND COUNTRY PLANNING ASSOCIATION (at the Royal Empire Society, Northumberland Avenue, London, W.C.2).—Conference on "Country Towns in a National Planning Policy".*

Friday, October 22—Sunday, October 24

INSTITUTE OF INDUSTRIAL ADMINISTRATION (at the Waldorf Hotel, Aldwych, London, W.C.2).—Conference on "Management in Action".

Saturday, October 23

SHEFFIELD METALLURGICAL ASSOCIATION, at 2.30 p.m.—Discussion on "The Education and Training of Metallurgists" (to be opened by Dr. Edwin Gregory).

Monday, October 25

ROYAL GEOGRAPHICAL SOCIETY (at Kensington Gore, London, S.W.7), at 5 p.m.—"Flying Boats over Africa" (Kodachrome Film by courtesy of B.O.A.C., Commentary by Mr. Ronald W. Waugh).

INSTITUTION OF ELECTRICAL ENGINEERS (at Savoy Place, Victoria Embankment, London, W.C.2), at 5.30 p.m.—Discussion on "How Far is International Standardization in the National Interest?" (to be opened by Colonel Sir A. Stanley Angwin).

ASSOCIATION OF AUSTRIAN ENGINEERS, CHEMISTS AND SCIENTIFIC WORKERS IN GREAT BRITAIN (at the Austrian Centre Swiss Cottage, 69 Eton Avenue, Hampstead, London, N.W.3), at 7 p.m.—Mr. David Cushman Coyle: "The Tennessee Valley Authority—Democratic Planning of a Water System in U.S.A.".

Tuesday, October 26

BRITISH SOCIETY FOR INTERNATIONAL BIBLIOGRAPHY (at the Science Museum, Exhibition Road, South Kensington, London, S.W.7), at 2.15 p.m.—Mr. H. Rottenburg: "The Universal Decimal Classification as the Keystone of the Publishing and Bookselling Business"; Dr. R. L. Sheppard: "The Bureau of Hygiene and Tropical Diseases".

CHADWICK PUBLIC LECTURE (at the London School of Hygiene and Tropical Medicine, Keppel Street, Gower Street, London, W.C.1), at 2.30 p.m.—Miss Margery Fry: "Ill Health and Ill Doing".*

EUGENICS SOCIETY (at the Royal Society, Burlington House, Piccadilly, London, W.1), at 5.30 p.m.—Dr. A. Spencer Paterson: "The Size of the Family of the Business, Professional and Titled Classes"

Thursday, October 28

OIL AND COLOUR CHEMISTS' ASSOCIATION (MANCHESTER SECTION). (in the Engineers' Club, Albert Square, Manchester), at 2 p.m.—Dr. W. J. S. Naunton: "Molecules without Tears".

LINNEAN SOCIETY OF LONDON (joint meeting with the ZOOLOGICAL SOCIETY OF LONDON) (at the Linnean Society, Burlington House, Piccadilly, London, W.1), at 3 p.m.—General Meeting; at 3.15 p.m.—Dr. J. F. G. Wheeler: "On a Humpbacked Whale taken in Bermuda in 1942"; at 3.35 p.m.—Mr. Gilbert J. Arrow: "Polymorphism in Giant Beetles"; at 3.55 p.m.—Dr. V. J. Chapman: "1939 Cambridge University Expedition to Jamaica".

BRITISH INSTITUTION OF RADIO ENGINEERS (LONDON SECTION) (at the Institution of Structural Engineers, 11 Upper Belgrave Street, London, S.W.1), at 6.30 p.m.—Mr. John Logie Baird: "Colour and Stereoscopic Television".

ASSOCIATION OF AUSTRIAN ENGINEERS, CHEMISTS AND SCIENTIFIC WORKERS IN GREAT BRITAIN (joint meeting with the ROYAL NETHERLANDS INSTITUTION OF ENGINEERS) (at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, London, S.W.1), at 7 p.m.—Mr. P. Kaufmann: "District Heating".

Friday, October 29

NORTH-EAST COAST INSTITUTION OF ENGINEERS AND SHIPBUILDERS (in the Lecture Theatre of the Mining Institute, Newcastle-upon-Tyne), at 6 p.m.—Dr. G. A. Hankins: "Experimental Fluid Dynamics Applied to Engineering Practice" (Andrew Laing Lecture).

Saturday, October 30

ROYAL ANTHROPOLOGICAL INSTITUTE (at the Royal Society, Burlington House, Piccadilly, London, W.1).—Centenary Meeting.

At 11.15 a.m.—Sir John L. Myres: "A Century of Our Work".

At 3 p.m. (at 21 Bedford Square, London, W.C.1).—"The Future of Anthropology". (Dr. G. M. Morant: Physical Anthropology; Prof. V. G. Childe: Archæology; Mr. R. U. Sayce: Material Culture; Dr. R. Firth: Social Anthropology).

APPOINTMENTS VACANT

APPLICATIONS are invited for the following appointments on or before the dates mentioned:

EDUCATIONAL PSYCHOLOGIST—The Director of Education, Municipal Buildings, Castle Street, Aberdeen (October 30).

TEACHER (MALE) OF GENERAL SCIENCE AND MATHEMATICS to students in full-time Junior and part-time day courses in the College of Technology—The Director of Education, Education Offices, Rotherham (October 30).

HORTICULTURAL OFFICER to take charge of advisory and demonstration work on commercial holdings and matters arising from the Horticultural Cropping Orders—The Executive Officer, Hampshire War Agricultural Executive Committee, The Castle, Winchester (October 30).

WATERWORKS ENGINEER AND MANAGER—The Town Clerk, Town Hall, Halifax (endorsed 'Waterworks Engineer and Manager') (November 1).

ASSISTANT LECTURER IN ZOOLOGY—The Registrar, University College, Nottingham (November 1).

ASSISTANT LECTURER IN AGRICULTURAL BACTERIOLOGY—The Registrar, University, Leeds 2 (November 6).

PROFESSOR OF ENGINEERING—The Registrar, University College, Singleton Park, Swansea (November 20).

SENIOR LECTURER IN ELECTROTECHNOLOGY at leading Technical College, Chile—The British Council, 3 Hanover Street, London, W.1 (endorsed 'Chile').

ASSISTANT ENGINEER for the Government of Northern Rhodesia Public Works Department—The Ministry of Labour and National Service, Central (Technical and Scientific) Register, Alexandra House, Kingsway, London, W.C.2 (quoting Reference No. E.697).

WATERWORKS ENGINEER for the Nigerian Government Public Works Department—The Ministry of Labour and National Service, Central (Technical and Scientific) Register, Alexandra House, Kingsway, London, W.C.2 (quoting Reference No. E.771).

EXECUTIVE ENGINEER for the Sierra Leone Government Public Works Department—The Ministry of Labour and National Service, Central (Technical and Scientific) Register, Alexandra House, Kingsway, London, W.C.2 (quoting Reference No. E.774).

MASTER OF ENGINEERING, whose main work will be the teaching of Engineering and the organization of Junior Technical Classes for boys of 14 to 16—The Headmaster, The Gateway School, Leicester.

CIVILIAN TECHNICAL OFFICER for a Government Department near London with (1) expert knowledge of direct and alternating current generators, regulating gear and switchgear, rotary and static converters, internal combustion engines, primary and secondary batteries, radio communication senders, receivers and station accessories, telephone and transmission apparatus, including hand sets, carrier telephony and voice frequency telegraph equipment, teleprinter and cable laying plant, or (2) ability to assess modern designs of above equipment for maintenance spares—The Ministry of Labour and National Service, Appointments Department, Q.S. 24, Kingsway, London, W.C.2 (quoting Reference No. Q.16848).

FOR GOVERNMENT POSTS IN INDIA—INDUSTRIAL PLANNING OFFICER (GENERAL), (Reference No. C.1911A), with sound mechanical training and at least five years' subsequent supervisory experience in recognized mechanical workshop; DESIGN OFFICER (Reference No. C.1912A), first-class Mechanical Engineer with up-to-date experience in Design of Light Mechanical Engineering Work; ASSISTANT INDUSTRIAL PLANNING OFFICER (Ammunition) (Reference No. C.1913A), with first-class mechanical training and knowledge of Modern Methods of Production and specialized experience in Light Press Tool Work and Machinery Components for Air Bomb; ASSISTANT INDUSTRIAL PLANNING OFFICER (Non-Ferrous) (Reference No. C.1914A), with at least five years' experience in Production of Non-ferrous Metals and Alloys, and be familiar with Wire Drawing, Sheet and Strip Rolling, and Sand Casting and Electrodepositing; ASSISTANT INDUSTRIAL PLANNING OFFICER (Tools) (Reference No. C.1915A), with good experience in Machine Shop Process Planning and Jig Design experience.—The Ministry of Labour and National Service, Central (Technical and Scientific) Register, Alexandra House, Kingsway, London, W.C.2 (quoting the appropriate Reference No.).